TECHNOLOGY DEPT.

PUBLIC LIBRARY
JAN 25 1930
DETROIT

A National Newspaper for Every Branch of the Industry

First Copy

Automotive Daily News

CARS · SHOP EQUIPMENT · TRUCKS · AVIATION · PARTS · ACCESSORIES · TIRES

Vol. 10. No. 1126 — Entered as second-class matter Aug. 27, 1925, Post Office, N. Y., N. Y., Under Act of March 3, 1879. — NEW YORK, TUESDAY, JANUARY 21, 1930 — 10 Cents. $12 Per Year

U. S. Production in 1929 Reaches 5,358,361

Fuels Feature S. A. E. Discussions Today

ANNUAL MEETING OPENS IN DETROIT

Reeves to Speak on 1930 Business Outlook Wednesday

Special from A. D. N. Detroit Bureau

DETROIT, Jan. 20.—Heavy attendance at the annual meeting of the Society of Automotive Engineers, which opened here this morning, was forecast in the early registrations at the Book-Cadillac Hotel. Technical programs which have been arranged for the four-day meeting cover a wide range of problems with which the engineers will be faced during the coming year.

The threatened introduction of the Diesel engine into automotive transportation, vital changes in carburetion, fuel economy, the use of tungsten-carbide steel in production, decided improvement in comfort-giving qualities in automobile design and a number of new automotive inventions will be discussed at length during the sessions.

A feature of the meeting also will be an address by Alfred Reeves, general manager of the National Automobile Chamber of Commerce on "What 1930 Offers to the Motor Industry." Mr. Reeves, who will address the engineers Wednesday evening, will outline the financial and business outlook of the industry. He has also arranged to answer all questions, either oral or written, which are related to the industry.

The first session today was the standards session presided over by A. J. Scaife, chairman. An informal discussion of the responsibility of individual manufacturers in support of standardization was instigated by B. M. Swarr of General Motors Corporation.

The annual business meeting, presided over by W. R. Strickland, president, was held at 8 o'clock this evening. The announcement of the election of E. P. Warner as president and other officers for 1930 was made. Following the business meeting the production session was held under the chairmanship of E. P. Warner, Dean Dexter S. Kimball, Sibley College, Cornell University.

(Continued on Page 7)

TODAY'S S. A. E. PAPERS

COMPLETE text of the papers covering a "Comparison of Anti-Knock Ratings Determined in Different Laboratories" and "Detonation Characteristics of Some of the Fuels Suggested as Standards of Anti-Knock Quality," which will be presented at the detonation session of the annual meeting of the Society of Automotive Engineers at the Book Cadillac Hotel in Detroit this afternoon, will be found on pages 8 and 10 of this issue.

MARMON'S PROFIT FOR NINE MONTHS $727,100

Indianapolis, Ind., Jan. 20.—G. M. Williams, president of the Marmon Motor Car Company, reports that notwithstanding that the company has written off the entire cost of certain abnormal and extraordinary expenses aggregating approximately $1,500,000, the net profit for the nine months ended November 30, 1929, amounted to $727,010 after provision for Federal taxes and all other charges.

Mr. Williams said that the unusual expense completely written off during this period included the extra cost of introducing the new Roosevelt car and becoming established in the thousand dollar field, the cost of developing a dealer organization which now numbers about 1,500 dealers, more than double the number of Marmon dealers at the beginning of this period, and the expense incidental to the development and preparations for the entire line of Marmon motor cars just introduced to the public at the National Automobile Show in New York.

"As a result of these things Marmon potential earning position has never been more secure in its entire history, a very gratifying accomplishment," Mr. Williams said. "Our progress to date during the fourth quarter which will end with February and our very favorable order position at this time indicate substantial earnings for the last quarter and a very good year during 1930."

Proposed French Tariff Boosts Rates 65 to 100%

Special from A. D. N. Washington Bureau

WASHINGTON, Jan. 20.—The proposed increase in the French tariff low-priced American and other foreign cars will range between 65 and 100 per cent., while cars in the medium and high-priced classes will suffer a smaller increase. In any case, however, the proposed duty will be at least equal to 45 per cent. of the c. i. f. value.

This is the interpretation of the French bill providing for specific rates of import duties on complete automobiles, chassis and bodies made public today by the Department of Commerce upon receipt of a cablegram from William L. Finger, United States Trade Commissioner at Paris.

Mr. Finger's cablegram confirmed a report from highly reliable sources in Washington, as published by The Automotive Daily News, January 17, that the National Automobile Chamber of Commerce will be given ample opportunity to present arguments against the French measure.

"It is believed that this bill and a preceding bill proposing specific duties on automobile parts," Mr. Finger cabled, "will not be rushed through without giving American automotive interests an opportunity to be heard."

Passage of the bills in a shorter period than three weeks seems unlikely, according to the French opinion.

The range of the proposed rates

(Continued on Page 6)

NEW YORK SHOW BLOW TO CALAMITY HOWLERS

New York, Jan. 20.—Over 900 actual sales, divided among twenty-five dealers, together with 14,000 potential prospects, were the result of the 1930 Automobile Show, as revealed by the survey just completed by the Automobile Merchants' Association of New York.

Accompanying this report is a detailed account by each exhibitor which reflects the results of actual contacts with an optimistic buying public during the period of the show. Comparisons with previous shows indicate a larger net sale, more prospects and all attendance records broken. Furthermore, it was not composed of mere "window shoppers" or curiosity seekers, but a genuine interest was displayed, the survey indicated.

The net results, A. M. A. officials state, belie the predictions of the calamity howlers and pessimists, who predicted, following the market crashes of October, that the automobile industry would be the first to suffer, and that a serious business depression in America's largest industry was inevitable.

The sales effected were not confined to the lower-priced cars, but were uniformly distributed among the higher grade, as well as middle class cars, which clearly indicates that the underlying buying power of the public is still intact and sound.

A volume of business of $5,000,000,000 in passenger cars and trucks for the current year is predicted on the basis of this survey.

CHEVROLET DEALERS IN DETROIT FOR MEETING

Special from A. D. N. Detroit Bureau

Detroit, Jan. 20.—Eleven hundred Chevrolet dealers, associated bankers and salesmen are meeting in Detroit today with home office officials to hear the extensive sales program to be effected by the company this year.

H. J. Klingler, vice-president and general sales manager, and other executives of the central office are announcing the company's plans at an elaborate stage presentation at the Oriole Theater.

This meeting is one of forty-two similar gatherings being held at as many key points in all quarters of the United States during a seven weeks' period ending February 15.

BOSTON SHOW CONTINUES TO DRAW LARGE CROWDS

Boston, Jan. 20.—Attendance continued to be heavy today at the twenty-eighth annual Boston automobile show, which opened Saturday afternoon. Keen interest is being displayed in the new cars on display and the dealers with displays report a satisfactory volume of orders taken.

Additional dealer meetings were announced for the week, with the Chrysler dealers scheduled to hold a luncheon Tuesday at the Copley-Plaza. Durant Motors will give a luncheon for its dealers also tomorrow at the Hotel Statler. The International Harvester Company will entertain its dealers Wednesday evening in the Copley-Plaza, and a business meeting of the Chevrolet dealer organization will be held on Thursday afternoon, followed by a banquet in the evening.

MILLION UNITS GAIN OVER 1928

Passenger Car Output 4,586,020; Trucks 754,752

Special from A. D. N. Washington Bureau

WASHINGTON, Jan. 20.—The automotive industry in the United States wound up the year 1929 with a grand total production of 5,358,361 passenger cars, trucks and taxicabs, as compared with 4,358,759 in the previous year, establishing a new high record output for all time, despite a slump in the last quarter, it was disclosed today by the final and official figures compiled by the Department of Commerce.

The output of passenger cars for the year amounted to 4,586,020, as against 3,821,136 in 1928, while the production of trucks increased from 530,910 to 754,752 in the same period.

An outstanding development in the industry was the production of taxicabs, which increased [illegible] 6,713 in 1928 to 17,589 in [illegible].

While the output of [illegible] cars last November and December took a sharp decline, the monthly average for 1929 was greater than in any previous month in the history of the industry.

While many factories temporarily shut down for inventory and others working part time during introduction of new 1930 models, production of passenger cars during December dropped to 91,234, the lowest monthly total since early 1922. The output for December, 1928, was 204,957.

While there was a slump in truck production during December, with 233 units, the total was only 890 units less than for the same month of 1928, and 2,041 greater than for January, 1928, the lowest monthly total for that year.

With the December figures for Canadian factories not yet available in Washington, being supplied by the Dominion Bureau of Statics, a comparison for the year with

(Continued on Page 2)

AMERICAN AUTOMOBILE PRODUCTION

	1929.	1928.	1927.	1926.
January	422,538	240,191	254,284	324,477
February	*497,705	336,300	323,390	382,490
March	*626,078	430,783	417,763	455,841
Three months	1,546,321	1,007,274	995,437	1,162,808
April	*663,311	434,315	430,993	460,838
May	*636,250	459,725	431,356	450,101
June	*567,424	425,195	333,025	408,020
Six months	3,413,306	2,326,509	2,074,003	2,073,747
July	*518,300	417,312	280,383	374,818
August	*512,842	492,543	285,724	369,009
September	*429,729	436,507	271,512	416,433
Nine months	4,874,177	3,672,871	2,911,622	3,234,007
October	*394,540	415,820	227,430	349,091
November	*226,994	268,905	140,987	266,129
December	**119,950	243,541	136,677	175,287
Twelve mos.	†5,615,661	4,601,130	3,580,380	4,505,661

*Revised. **United States only.
†Minus December production in Canada.

Tire Manufacturers Pay $11,493,539 in Dividends

NEW YORK, Jan. 20.—With conditions more normal than for several years, manufacturers of automobile tires and other rubber products in 1929 enjoyed one of their best periods in recent years, and dividend payments by this section of the automotive industry made a decided upward turn.

Six important dividend-paying companies in the rubber group paid dividends during 1929 amounting to $11,493,539.

The collapse of the crude rubber market in 1928 made that an exceptionally poor year for the tire manufacturers, with a resulting decline in dividend payments for their stockholders.

Real progress toward stabilization was made in 1929 and earnings increased and dividends accordingly. There are still several companies, however, that haven't resumed their dividend payments after the interruption of 1928. Some of the companies in this latter class are expected to get back into the dividend-paying group this year.

The most notable dividend event in 1929 among the rubber companies was the resumption of a $5 payment on the common stock by the Goodyear Tire and Rubber Company. This dividend was resumed in the middle of the year and two quarterly payments of $1.25 each made before the close of 1929.

Another notable event concerned one of the Goodyear subsidiaries, the Goodyear Tire and Rubber Company of Canada, which paid an extra dividend of $5 a share on its 40,000 shares of common stock dur-

(Continued on Page 11)

U. S. Output of Cars and Trucks 5,358,361 in 1929

(Continued from Page 1)

1928 in Canada was not possible today.

As shown in the accompanying table, American automobile production for the year 1929 reached 5,615,661, with the December figure for Canada missing. Allowing 5,000 for Canada in December, the total American output for the year would be 5,620,661, as compared with 4,601,130 for all of 1928, a gain of slightly more than 1,000,000.

The figures for production in United States factories were received from 145 manufacturers for recent months, 42 making passenger cars and 114 making trucks (eleven making both types of vehicles). Comparative tables follow:—

UNITED STATES

	Total.	Passenger Cars.	Trucks.	Taxicabs.
1928				
January	231,728	205,142	26,082	504
February	323,796	290,689	32,645	462
March	413,314	371,150	41,493	671
April	410,104	364,265	45,227	612
May	425,783	375,356	49,920	507
June	396,796	356,214	40,174	408
July	392,086	338,383	53,294	409
August	461,298	400,124	60,705	469
September	415,314	358,615	56,423	276
October	397,284	339,487	57,138	659
November	257,140	216,754	39,686	700
December	234,116	204,957	28,123	1,036
Total (year)	4,358,759	3,821,136	530,910	6,713
1929				
January	401,037	347,382	51,591	2,064
February	*466,418	405,708	*58,602	2,108
March	*585,457	513,344	*70,034	2,079
April	*621,910	537,225	*82,999	1,686
May	*604,691	516,055	*87,318	1,318
June	*545,932	452,598	*91,956	1,378
July	*500,839	426,137	*73,648	1,054
August	*498,628	441,942	*55,646	1,040
September	*415,912	364,786	*50,261	865
October	*380,017	320,327	*58,822	868
November	*217,570	*169,282	*46,642	*1,646
December	119,950	91,234	27,233	1,483
Total (year)	3,358,361	4,586,020	754,752	17,589

*Revised.

SUDDEN COLD SWAMPS LOUISVILLE, KY., GARAGES

Louisville, Ky., Jan. 20.—An unheralded drop to 10 below zero the morning of January 18, with a two-inch snowfall, resulted in Louisville shops being jammed with work of thawing out frozen motors. There was considerable real damage done to cars, as it had been quite warm, and the public was caught totally [unp]repared for the severe weather. [I]n Louisville since 1918. The cold spell has held floods in check and enabled bus, truck and other operations to resume service over the larger lines.

SWAIN JOINS GOODYEAR

Akron, Jan. 20.—J. G. Swain, former vice-president of Firestone Steel Products Company, has been made head of the Goodyear Rim Sales Department.

Used Cars to Have Their Day at Annual Hartford, Conn., Show

Hartford, Conn., Jan. 20.—For the first time in the history of the Hartford Automobile Dealers' Association used cars are to be featured in the annual automobile show, which opened here Saturday.

Friday night, after the close of the show, all new cars will be removed from the big drill shed and used cars of the selected variety will be substituted for the final day. The dealers all feel that a combined display of used cars should prove interesting to the public and result in many sales being made. Furthermore, it is held that such a move will necessarily elevate the used car to a higher plane in this community.

Each dealer in the association is grooming up his used cars for this initial public display.

Earl M. Taber, president of the association, said today that the committee in charge anticipates a crowd of 100,000 during the week.

STRAUSS SEES BUILDING UPTURN ABOUT MID-YEAR

New York, Jan. 20.—It is now apparent, with reports in for the final month of 1929 from the mass of American cities and towns, that the point of improved conditions has not been reached in the building industry, S. W. Strauss & Co. announces after analyzing official figures from 588 cities and towns of the country for building permits issued in December.

A loss of 39 per cent., compared with the same month of 1928 and of 19 per cent. from November, 1929, is shown. For the entire year the same centers revealed a loss of 12 per cent. from 1928 and 13 per cent. from 1927. The total of permits issued in these places in December was $154,957,653 and for the twelve months' period $3,379,977,311. These figures, of course, are for building projects only and do not include engineering projects.

"While these reports may seem disturbing to those who have been looking for an immediate upturn in building activites," the Strauss statement says, "they are not out of line with conservative expectations. With a favorable money market and the efforts being put forth by industrial leaders throughout the nation to keep general business on the go, it may reasonably be expected that a turn for the better in building operations will be forthcoming by mid-year or possibly earlier."

TOLEDO M. & M. A. CHOOSES SHELDON AS PRESIDENT

Toledo, O., Jan. 20.—J. A. Sheldon, works manager of Willys-Overland, Inc., has been elected president of the Merchants and Manufacturers Association here. Sheldon succeeds James M. Acklin, head of the Adkin Stamping Company. Daniel H. Kelley, executive vice-president of the Electric Auto-Lite Company, was elected first vice-president, with William E. Levis, recently elected president of the Owens-Illinois Glass Company, second vice-president.

NEW DISTRIBUTOR

Milwaukee, Wis., Jan. 17.—Arndorfer & Kuhl has been appointed Willys-Overland distributor for Milwaukee and thirteen adjacent counties, according to Paul G. Goeke, Wisconsin district sales manager.

SPARKS from DETROIT

Not Worried on Tariff

* * *

Moral for Tire Thieves

* * *

Sixes Going Strong

Fred Kingsbury—Detroit Editor

AUTOMOBILE manufacturers of Detroit are not greatly worried over the action of the State Department in refusing a request to protest against the proposed French motor tariff. It seems to be the general opinion in automotive circles in this city that no protest will be forthcoming unless the French rates are discriminatory.

Manufacturers have made plans to increase exports of motor vehicles this year, and export offices have been enlarged and new offices established in many foreign countries. Naturally, the makers of automobiles do not want anything to happen, which will interfere with this business, which showed a fine growth during 1928, and they are watching matters very closely.

It is true that a number of foreign countries have not expressed pleasure regarding the number of American motor cars that are being imported into their domains. They would like all this business themselves. However, the world likes American motors and undoubtedly will continue to buy them in large numbers.

* * *

HERE is a moral against stealing automobile tires:

The other night a tire thief started to work on an automobile parked at the curb on one of the city streets. He managed to get one tire removed when the jack slipped from under the rear axle. The handle of the jack caught the man in the neck and pinched him between the handle and the rear bumper. He was dead when discovered by a policeman.

The stealing of tires and accessories from automobiles has been prevalent in Detroit and vicinity during the winter.

* * *

R. M. Roland, advertising director of the Chrysler Sales Corporation, gave a "pep" talk the other night to automobile dealers and salesmen, just prior to the opening of the Detroit Automobile Show. Mr. Roland is well known as a speaker in the automotive industry.

* * *

Automobile men in Detroit are taking up bowling. All of the bowling alleys in the vicinity of the General Motors and Fisher Buildings are crowded every noon.

* * *

DETROIT people have been doing a great deal of talking recently about eight-cylinder automobiles and the great increase in the number of motors of this type in the last year.

Now it appears another company is thinking seriously of bringing out a straight eight. It will be medium size and very powerful.

Despite the great increase in eights, the sixes appear to be selling just as fast as ever and are just as popular.

* * *

MARTIN V. PULCHER, president of the Federal Motor Truck Company, is a happy man. His organization has just completed a most successful year, and the plant is steaming ahead at a rapid rate this month.

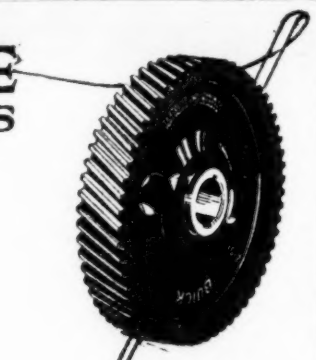
In a short time, all Federal dealers will gather in Detroit for the largest convention ever held by the Federal Company, and these dealers will hear just what the company has accomplished in the last year and plans that have been made for the next twelve months.

The Federal Motor Truck Company is one of the oldest organizations in the automotive field and has always enjoyed a large measure of success.

CAR DEATHS UP 11 PER CENT. DURING 1929 AGAINST 1928

Washington, Jan. 20.—The death rate from automobile accidents in 1929 increased 11 per cent. over 1928, according to the Bureau of Census, Department of Commerce. Total deaths from this cause for seventy-eight leading cities during 1929 were 8,403, as against 7,516 the year before, the 1929 rate being 25.5 per 100,000 population. The rate in Camden, N. J., was the highest during 1929 as in 1928, 70.4 per 100,000. The rate in Camden, however, from accidents occurring only within the city limits was only 29.6, which was below that of several cities, it was explained. Kansas City, Kan., had the lowest rate, 5.9 per 100,000.

TEXTOLITE
TIMING GEARS



It Takes Courage to be Right!

It is true that with gear timing-drive the limits of accuracy must be very close. Only a good manufacturer would have the courage to undertake the task — but every dealer and, in turn, the manufacturer reaps the reward that comes through owner satisfaction.

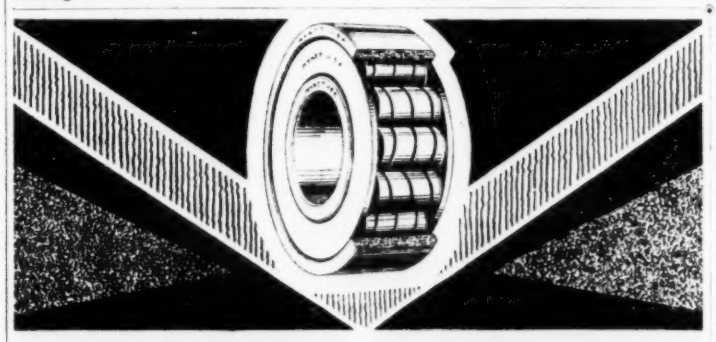
There is no compromise with accuracy in a good gear drive. It is a token of good manufacture throughout the car.

GE

[J]OIN US IN THE GENERAL ELECTRIC HOUR, BROADCAST EVERY SATURDAY AT 9 P.M., E.S.T. ON A NATION-WIDE N.B.C. NETWORK

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y. SALES OFFICES IN PRINCIPAL CITIES



HYATT
QUIET ROLLER BEARINGS

Hyatt Quiet Roller Bearings in the transmission insure longer life and no adjustments.

Motor Stocks Resu me Upward March at Week's End

Range of Automotive Stocks

WEEK ENDED SATURDAY, JANUARY 18, 1930
NEW YORK STOCK EXCHANGE

Previous, 1930 High	Previous, 1930 Low	Div.		Sales	High	Low	Close	Net Change
16¼	11½	....	Advance Rumely ...	10,300	16¼	12	12¼	— 2
31	22	....	do pf	2,700	31	26½	26½	— ½
131¾	121⅛	4.50	Air Reduction	24,000	130⅞	121⅛	123⅞	— 3¼
2½	1⅜	....	Ajax Rubber	3,500	2⅛	2	2⅛	— ⅛
53¾	49¼	3	Allis-Chalmers	16,800	53⅞	50¾	51¼	+ ½
45¼	40⅛	....	Am. Bosch Magneto.	9,300	45¼	40⅛	42¼	....
95⅞	7¼	7	Am. Chain pf.....			No sales		
2⅜	2¼	....	Am.-La France	400	2½	2¼	2¼	....
208¾	175½	4	Auburn Auto	2,400	188½	175½	180	— 2
38¼	32⅞	2	Bendix Aviation ...	17,800	35⅞	32⅞	33¾	— ¾
54⅜	50⅛	5	Bohn Aluminum ...	5,200	52½	50⅛	50½	— 1¼
37	32⅞	4	Borg-Warner	9,900	37	34¼	34¼	— ¾
17	14¼	....	Briggs Mfg. Co.....	17,300	15½	14¼	14½	— ½
23⅞	21¼	2	Briggs & Stratton..	400	23⅞	23⅜	23½	— ¼
16¼	13	....	Brockway Motor ...	1,900	15⅜	15	15	....
11¼	9⅜	1.60	E. G. Budd Mfg. Co.	800	10¾	10	10	— ¾
11¼	8⅛	1	Budd Wheel	3,300	10¾	8¾	8⅞	— 2
31	29⅞	2	Bullard Co.	900	30⅛	29⅞	30	— 1
59½	54	3	Caterpillar Tractor..	3,500	59½	56	57¾	+ 2¼
23¾	23	....	Chicago Pneu. Tool.	400	23	23	23	— ¾
28¾	27	3	Chicago Yellow Cab.	140	28½	27½	28½	+ 1⅛
38⅜	33¼	3	Chrysler Corp.	89,200	36	33¼	34¾	— ⅝
61⅞	25	3	Clarke Equipment...			No sales		
27½	23⅜	2	Commercial Credit..	9,000	27½	26	26¼	— ¾
79¼	76¼	6.50	do pf.....	790	79¼	76¼	76¼	— 2¾
41	36⅝	1.60	Com. Invest Trust..	8,000	39	36⅝	36⅝	— 2⅞
91	89	6.50	do pf	300	91	91	91	+ 2
6¾	5⅝	.80	Continental Motors.	19,400	6¾	6	6½	+ ½
80	66	3.50	Cutler Hammer	700	79	75½	77¾	— 1¼
120	112⅛	5.20	Du Pont	27,800	115¼	112¼	114⅜	— ⅛
31	27⅞	3	Eaton Axle & Spring	6,200	30⅞	28⅛	28⅝	....
86⅞	81	6	Electric Auto-Lite...	16,500	85½	82⅛	83	— 1
72¾	69¾	5	Elec. Stor. Battery..	1,800	72¾	70½	71	— 1
22½	3¼	....	Emerson Brant			No sales		
23	19	2.50	Evans Auto Load...	900	21	19	19	— 1
8	7¾	.80	Federal Motors	1,500	8	7¾	7⅞	— 1⅛
33⅛	29¾	1.60	Firestone T & R...	1,600	31¼	20¾	21	+ 1¼
86⅜	83½	6	do pf	3,700	85⅛	83½	83⅞	— ⅞
3½	3	....	Fisk Rubber	8,900	3½	3⅛	3¼	+ ⅛
16⅛	13	....	do 1st pf.....	130	15½	13½	14⅝	— ⅞
7⅞	5⅝	....	Gabriel Snubber ...	600	6⅞	6⅛	6⅛	— ⅞
4½	3½	....	Gardner Motor	1,500	4	3½	3½	— ½
63¼	60¼	....	General Electric ...	134,200	63⅛	60⅜	61⅜	....
42	37½	3.60	General Motors	321,800	39⅞	37½	39⅜	+ ⅜
121	117⅜	7	do pf	3,900	119¾	117⅜	118	— 1¾
34	31	2	Glidden Co.	6,200	33⅞	31	31⅜	— 1⅞
102	98½	7	do pf	110	101	98½	98½	— 1¾
45	40¼	4	Goodrich Co.	5,200	44¼	40¼	42	— 1½
96⅝	95⅝	7	do pf	100	96⅝	96⅝	96⅝	....
67	62	5	Goodyear T. & R...	6,000	65	62¼	62½	— 1⅞
94	90	7	do pf	700	94	93	93⅝	+ ⅜
11¼	9⅛	....	Graham-Paige Motor	4,900	10¼	9⅛	9⅝	....
8⅞	6¼	....	Hayes Body	2,300	8⅛	7¾	7¾	....
23½	19	2	Houdaille Hershey..	7,280	23½	19¼	22⅝	+ 2⅞
62⅞	53⅝	5	Hudson Motor Car..	40,300	57¼	53⅝	55¼	— ⅛
24¾	20¼	2	Hupp Motor Car...	19,500	23½	20¼	21	— ¾
7	5	....	Indian Motocycle...	11,500	6¼	5½	6	— ⅜
5⅜	4¼	....	Intercon. Rubber...	500	4⅜	4⅜	4⅝	+ ⅛
83¾	78⅜	2.50	Internat. Harvester..	12,800	83¾	80⅛	80⅛	— ⅝
141⅞	141	7	do pf	800	141½	141¼	141½	— ¼
132¾	117	3	Johns-Manville	66,800	132¾	124½	126	— 1
2½	2⅛	....	Jordan Motor Car..	2,800	2¼	2⅛	2⅛	— ⅛
5½	3¼	....	Kelly-Springfield ...	25,800	5½	4⅛	4½	+ ¼
36	29	....	do 6s pf.....	10	36	36	36	+ 2⅞
24¾	20⅛	....	do 8s pf.....	460	24⅝	21	24¾	+ 2¼
25⅜	22⅛	3	Kelsey-Hayes Wheel.	5,100	23⅞	23	23⅝	— ⅛
8½	6¼	....	Lee Rubber & Tire..	2,900	8½	7⅜	7½	+ ¼
41	39	2.60	Link Belt	300	41	39	39	— 2
73¾	70	6	Mack Trucks	2,400	72½	70¼	70¼	— 1⅝
42½	39⅞	6	Marlin Rockwell ...	1,200	41⅛	39⅞	39⅞	— 2⅜
27⅜	20⅜	4	Marmon Motor	7,900	24	20⅜	21	— 2⅞
3½	3	....	Martin Parry	600	3⅛	3	3⅛	— ⅜
18	15½	2	Mengel Co.	3,800	17½	15⅛	16	— 1¾
4½	4	....	Miller Rubber	700	4½	4⅜	4½	+ ½
5¼	3⅞	....	Moon Motors	1,600	4½	3⅞	4⅛	— ¼
5¾	4⅛	....	Moto Meter G. & E.	3,800	5	4⅛	4⅜	— ⅛
65	55	10	Motor Products	500	59	53	53	— 5½
28⅞	26½	3	Motor Wheel Corp..	1,700	28½	26⅝	26⅞	— 1
13⅞	12⅞	....	Mullins Mfg. Co....	2,700	17½	15	15	— 2⅜
22	18	2	Murray Corp.	12,400	19⅞	18	18	— 1
53½	51⅛	6	Nash Motors	18,200	55⅛	51⅛	52¼	+ ½
6¼	¾	....	Norwalk T. & R....			No sales		
45	8	....	do pf			No sales		
3⅜	2¾	....	Omnibus Corp.	900	3¼	3	3	— ⅜
33⅜	30½	2.50	Otis Steel	900	33	31½	31½	— 2⅛
17⅞	15⅜	1	Packard Motor Car.	49,000	16	15⅜	15½	— ½
8½	6⅞	....	Peerless Motor Car.	3,800	8⅜	6⅞	7½	+ 1¼
26	21½	....	Pierce-Arrow A	1,700	24⅝	21½	21½	— 4½
37½	17¾	6	do pf			No sales		
37	33	2.60	Raybestos Manhattan	6,500	36¼	34	35¼	— 1⅛
12⅛	11	1.60	Reo Motors	3,400	11¾	11	11	— ¼
4¾	4	....	Reynolds Spring	1,000	4¼	4	4	....
27½	21½	....	Spicer Mfg. Co.....	500	26¼	25½	25½	....
39¼	39¼	3	do pf	100	39¼	39¼	39¼	....
41¼	38	3.50	Stewart-Warner Spd.	10,800	41¼	38½	38¾	— 1⅝
45⅞	40¾	5	Studebaker Co.	28,900	44	40¾	42¾	— 1¼
126	115	7	do pf			No sales		
16½	14½	1.80	Timken Detroit Axle	3,000	15¾	14¼	14⅝	— 1⅜
80½	70⅜	3	Timken Roller Bear.	55,800	76¾	70⅜	72¼	— 3¾
34¼	30⅝	2.50	Trico Products	1,800	33½	32	32⅞	— 1
27½	21⅛	....	U. S. Rubber.....	60,300	25⅛	21⅛	23	— 2¼
52¾	47¾	....	do 1st pf.....	3,100	50	47¾	49	+ ¼
20⅞	18⅝	2	Warner Quinlan ...	5,700	20½	18½	18⅞	— 1¼
47⅞	43⅝	2	Westinghouse A. B..	7,800	46	43⅜	43¾	— 1¼
32½	31	2	White Motors	200	32⅛	32	32	— ⅛
29¾	27	2.50	Wilcox Rich A.....	400	29	27½	28¾	— ¼
21⅞	19½	2	do B	3,800	21¼	19½	20	— ⅞
9½	7½	1.20	Willys-Overland	25,200	9¼	7⅞	8⅛	+ 1⅛
80¼	67	7	do pf	200	80¼	80	80¼	+13
75½	75	4	Yale & Towne.....	100	75	75	75	— ½
14⅞	12¾	....	Yellow Tr. & C. B..	18,500	13⅞	12¾	13	— ¼
96½	80	....	do pf.			No sales		

GENERAL MOTORS BECOMES LEADER

By CONRAD ALEXANDER

NEW YORK, Jan. 20.—**After floundering around in the fore part of the week without any definite trend in one direction or the other, motor stocks listed on the various stock exchanges reasserted themselves late in the week and resumed their upward march, with General Motors returning to the role of leader.**

The losses of the earlier days, however, outweighed the gains of the end of the week, most of which came on Saturday, and the price averages finished the week with losses of fractions.

Word that excellent buying was coming into General Motors from banking houses representing interests at Wilmington, Del., brought that stock back into the public eye, and, after having made a new low for the year earlier in the week, it spurted on Saturday and managed to close ⅜ of a point higher than its price at the finish of the preceding week.

Announcement that a second Managers Securities Company was being formed by about eighty executives of General Motors also added strength to the stock. This new company will replace the old managers' organization formed in 1923 and which was credited with having made a millionaire out of every executive who participated in it. The new company will be formed along lines similar to the old one and, it is reported, General Motors has acquired 1,000,000 shares of its own stock, which it will sell to the investing unit. This stock was said to have been bought at a level slightly below the current prevailing price.

If the leadership of General Motors continues to assert itself this week, the general body of automotive shares should rise in sympathy. But a sustained upward march is made difficult by the fact that any outstanding bulge in any stock these days is met by heavy offerings from traders who wish to take small profits.

The average price of the sixty representative automotive stocks used in the Automotive Daily News compilation closed the week at 33.50, a decline of .51 of a point from the previous week. This compared with a loss of 1.01 in the week before.

The twenty representative passenger car stocks lost .49 of a point during the week, as compared with a loss of 2.64 in the week before, bringing the average price to 35.28.

The twenty accessories dropped .68 of a point, to 36.57, as compared with a loss of .42 in the week before.

The ten rubber company stocks declined .31 of a point, to 36.91, as against a gain of .25 of a point in the preceding week.

The ten truck company issues were off .40 of a point for the week, as against a loss of .13 in the week before, bringing the average price of 20.40.

Earning statements of automotive manufacturers for the year 1929 will begin to appear soon. While the earnings for the year will compare favorably with 1928, many of the reports will show a decided falling off in income in the final quarter of last year, and this factor can be expected to depress the motor stocks until after they have been made public. After these reports have been announced and a more decided upward trend in production has made itself felt, the way will be cleared for a more sustained upward march of the motor stocks.

AUTOMOTIVE DAILY NEWS STOCK PRICE AVERAGES

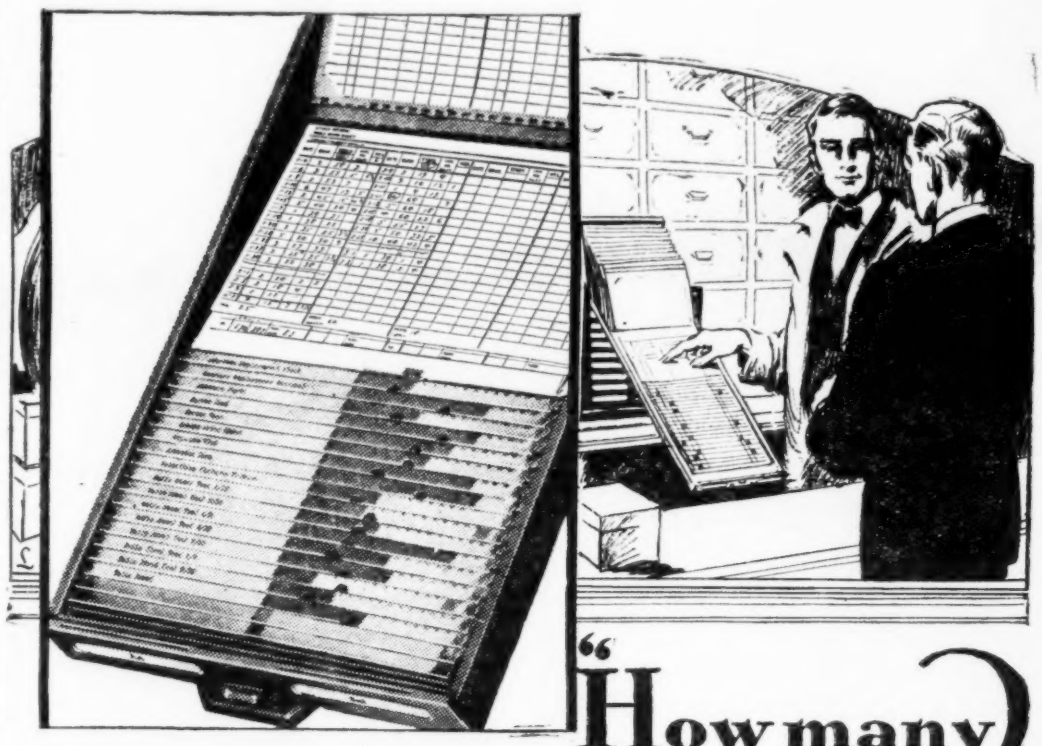
	Jan. 11.	Jan. 18.	Net Ch'ge.
60 automotives ..	34.01	33.50	— .51
20 pass. cars ...	35.77	35.28	— .49
20 accessories ...	37.25	36.57	— .68
10 rubbers	37.22	36.91	— .31
10 trucks	20.80	20.40	— .40

ACTIVE STOCKS

General Motors ..	39	39⅜	+ ⅜
Chrysler	35⅛	34¾	— ⅜
Packard	16	15½	— ½
Mack	72	70¼	— 1¾
Goodyear	64¾	62½	— 2¼
Bendix	34½	33¾	— ¾

NIGHT SHIFT FOR DURA CO.

Toledo, O., Jan. 20.—The Dura Company, manufacturers of automobile hardware, has put on a night shift and expects to be operating at greatly increased schedules by February 1.



"How many hub caps on hand, Jack?"

ASK your stock clerk this or any other question regarding stock on hand. Can he answer promptly or must he hunt around and count 'em?

If he uses a KARDEX Stock Control, he'll tell you in 15 seconds anything you want to know. KARDEX keeps track of your inventory daily. Brilliant colored signals flash "Maximum reached," "Minimum reached," "in transit," "obsolete." You can't go wrong. You purchase automatically and economically. Turnover and profits grow together. Errors are eliminated. 50% of clerk time and cost is done away with. KARDEX pays for itself and makes a profit the first year in use. Modern garage and automotive dealers are adopting it everywhere.

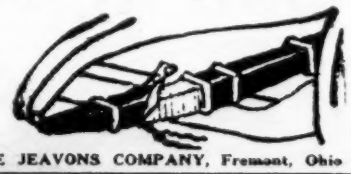
Get in touch with a Remington Rand man today. He's as near to you as your telephone.

Kardex Division
REMINGTON RAND BUSINESS SERVICE *Inc.*
BUFFALO, NEW YORK
Sales Offices in all Principal Cities

REMINGTON KALAMAZOO · KARDEX POWERS · RAND DALTON · SAFE-CABINET LINE-A-TIME · BAKER-VAWTER LIBRARY BUREAU

Kardex Division, Remington Rand Business Service Inc.
Remington Rand Bldg., Buffalo, N. Y.
Gentlemen: Send me your booklet, Stock Control.
Name _____ *Firm* _____
Address _____ *City* _____
A. D. N. 1

Give That "Parlor Car Comfort"
with JEAVONS
Fabric Spring Covers
They prevent rust accumulation and keep the original "give" in springs because they protect them at the vital point. Made of one piece SPECIAL heavy double coated imitation leather, conforming to the shape of spring. They are working wonders in the riding comfort of cars everywhere—they eliminate squeaks and hard riding.
Ask your jobber or write direct.
General Office and Factory—THE JEAVONS COMPANY, Fremont, Ohio



Automotive Daily News

"Of, By and For the Entire Automotive Industry"

AUTOMOTIVE DAILY NEWS PUBLISHING CORPORATION,
350 Hudson St., New York, N. Y.
D. J. Elder, President. H. A. Tarantous, Vice-President. Alexander Johnston, Secretary.

Entered as second-class matter August 27, 1925, at the post office at New York, N. Y., under the Act of March 3, 1879.

Circulation—Net paid Average over 10,000 daily guaranteed. Member A. B. C.

TUESDAY, JANUARY 21, 1930

ADVERTISING AND BUSINESS HEADQUARTERS

2716 Graybar Bldg., New York, N. Y. Telephone LEX ington 6388
Harry A. Tarantous, Business Manager. J. Edward Schipper, Eastern Manager.
George M. Slocum, Manager Detroit Bureau, 427-8 Fisher Building, Detroit, Mich., phone Empire 3500: Willard R. Cotton, Western Manager, 333 North Michigan Ave., Chicago, Ill., phone Central 5936: Metz B. Hayes, New England Manager, Little Building, Boston, Mass.: Blanchard, Nichols & Coleman, American National Bank Building, San Francisco, Cal.; Lincoln Building, Los Angeles, Cal.; 1037 Henry Building, Seattle, Wash.: Philadelphia Office, 15th and Cherry Streets. **Address ALL advertising and business correspondence to 2716 Graybar Building, New York City.**

EDITORIAL DEPARTMENT

350 Hudson St., New York, N. Y. Telephone CAN al 1000
Alexander Johnston, Editor. L. E. Levick, News Editor.
Detroit Bureau—Fred Kingsbury, Editor, 427-8 Fisher Building, Detroit, Mich., phone Empire 3500. Contributing Editor, John C. Wetmore.

Mail subscriptions to **CIRCULATION DEPARTMENT**—C. H. Wilson, Manager.
1926 Broadway, New York, N. Y. Telephone TRA falgar 4500
Subscription Rates—One year, $12.00, two years, $20.00, for United States and Canada. To Foreign Countries—One year, $15.00; two years, $26.00. Single copies, 10 cents.

A Peril of Optimism

WE have spoken before this of the danger that the automotive manufacturer encourages when he sets prices on schedules that represent the maximum output that he can hope to reach in a given year. The year may turn out to be all that the manufacturer hoped that it would be; some years are that way. On the other hand, conditions may change during the twelve months, so that the production schedule that had appeared entirely possible in January, viewed through rose-colored spectacles, actually becomes impossible of attainment.

The obvious result of such overproduction is the tendency to stuff the dealers with more cars than they can sell on a businesslike basis. The dealers in turn have to resort to long trading and other forms of price cutting, for that is exactly what it amounts to.

Now, here is a secondary danger that lurks in this loose optimism that results in overproduction. If the general public gets used to finding dealers overloaded during November and December, and ready to give what amounts to price cuts, the first thing we know, old man John J. Public is going to wait for the November and December price cuts. The bargain hunter, and very few Americans dislike bargains, is going to say when asked to buy in May or June or July, "No, I guess I'll wait a bit. The old bus is running all right and along in November and December I can pick up a real buy, when the dealers start unloading their floors to get ready for the new models." If the public generally ever begins to assume that attitude, it is going to be a matter for regret.

Production ought to be so graduated that dealers are not unduly loaded up toward the end of the year. Then there will be no occasion for late price cuts to clear the floors for new models.

An Advertising Opportunity

IN New York there is a famous jewelry concern with a magnificent building on the leading avenue and look where you will on the outside of this structure you will nowhere find the name of the company doing business within. There is a fine touch of assurance in this refusal to tell the world who lives in that particular business house, but isn't it a sad waste of advertising opportunity for an American company?

Any one who has traveled much through the central sections of the country must have been impressed by the number of towns and cities through which he has passed without even knowing their names. Occasionally one catches the small sign at the railway depot, or sees a sign, "The Blinkopolis Laundry," or what not, which lets him into the secret that he is passing through Blinkopolis, Indihio. Any progressive town ought to take pains to let travelers passing through know what the place is and, if possible, what it does.

Again, we frequently notice motor trucks carrying on their sides the name of the company owning them, but adding no hint of the address at which the concern is located. This was all right in the days when hauling was done by horse-drawn vehicles, which did not travel far from their bases. Today the motor truck may make deliveries thirty or forty miles from its home plant and the address of the company operating it on the side is a most useful form of direct advertising.

We have got to remember that we live in an age of rapid movement and generous distances. We must not assume that every person who sees the truck during its day's travel is a neighbor who knows, of course, the address of the company. The addition of the address is obvious and valuable publicity.

AUBURN DOUBLES ITS NET PROFIT IN 1929

Auburn, Ind., Jan. 20.—The Auburn Automobile Company, with per share earnings double those of the previous year, established a new high profit record in 1929.

The annual report, issued today, reveals that net income for the year ended November 30, 1929, totaled $3,603,200, which, after all deductions and charge-offs, equalled $21.23 a share on the 169,686 shares of capital stock outstanding. This compares with $1,523,290, or $10.77 a share on 141,450 shares of stock in the preceding year.

As a result of the growth in sales of Auburn cars and the introduction of two entirely new lines under the Duesenberg and Cord names the company's net sales increased 57.61 per cent. Despite the engineering and development expense incident to the introduction of these new lines—all of which expense has been charged off—the operating profit was 81 per cent. greater than the previous year.

During the first thirteen days of January shipments by Auburn totaled 629 cars, as compared with 395 in the first fifteen days a year ago, an announcement today by R. H. Faulkner, vice-president, states. This represents a gain of 59 per cent.

Earnings of Duesenberg, Inc., controlled by Auburn, were $84,055 in 1929, although the first six months of the year showed a loss of $107,000. President E. L. Cord reports in a letter to stockholders.

COMING EVENTS

JANUARY

18-25—**Baltimore, Md.** Automobile show.
18-25—**Brooklyn, N. Y.** Motor Vehicle Dealers' Association Automobile Show.
18-25—**Boston Mass.** Annual Automobile Show.
18-25—**Detroit, Mich.** Automobile Show.
18-25—**Harrisburg, Pa.** Annual Automobile Show of the Harrisburg Automotive Trade Association.
18-25—**Hartford, Conn.** Automobile show.
18-25—**Louisville, Ky.** Automobile show.
18-25—**Montreal, Canada.** Automobile Trade Association National Eastern Canadian Motor Show.
18-25—**Pittsburgh, Pa.** Automobile show at Motor Square Garden.
20-25—**St. Petersburg, Fla.** Automobile Show.
20-24—**Montreal, Can.** Garage and shop equipment show.
20-25—**Wilkes-Barre, Pa.** Automobile Show.
20-25—**Huntington, W. Va.** Automobile Show.
20-25—**Nashville, Tenn.** Automobile show at Hippodrome.
20-25—**Rochester, N. Y.** Automobile show
20-25—**Springfield, Mass.** Automobile show
20-25—**Erie, Pa.** Automobile Show.
20-25—**New Brunswick, N. J.** Automobile Dealers' Association Show at Sesser Building.
20-25—**Wilmington, Del.** Automobile Show.
20-27—**Paterson, N. J.** Automobile Show.
21-24—**Detroit, Mich.** Society of Automotive Engineers' Annual Meeting.
25-Feb. 1—**Chicago.** National Automobile show.
25-Feb. 1—**Washington, D. C.** Automobile Show.
25-Feb. 1—**Cleveland, O.** Show at Public Auditorium, auspices of Cleveland Automobile Manufacturers and Dealers' Association.
25-Feb. 1—**York, Pa.**—Automobile Show at Shipley Garage.
26-Feb. 1—**Columbus, O.** Automobile Show.
27-28—**Chicago.** National Automobile Dealers' Association Convention.
27-Feb. 1—**Portland, Me.** Automobile Show.
27-Feb. 4—**Jersey City, N. J.** Hudson County Automobile Dealers' Show
29-Feb. 1—**Batavia, N. Y.** Automobile Show
29-31—**Cleveland, O.** Ohio Association of Commercial Haulers' Convention.
29-Feb. 1—**New Haven, Conn.** Automobile show.
29-Feb. 1.—**Lawrence, Mass.** Automobile Show.
30-Feb. 1—**Bristol, Conn.** National Guard, Company L. Automobile Show.

FEBRUARY

1- 8—**Minneapolis-St. Paul.** Automobile show.
1- 8—**San Francisco.** Pacific Automobile show at Civic Auditorium.
2- 6—**Dayton, O.** Automobile Show.
3- 8—**Cumberland, Md.** Automobile show
3- 8—**Ottawa, Canada.** Motor show.
3- 8—**Scranton, Pa.** Automobile show.
3- 8—**Syracuse, N. Y.** Automobile Show
3- 8—**Toledo, O.** Automobile show.
3- 8—**Wichita, Kan.** Automobile show
4—**Minneapolis, Minn.** Motor Trades Association, annual meeting at Hotel Badesson.
4- 9—**St. Louis, Mo.** Automobile Show.
5- 8—**Elgin, Ill.** Automobile Show.
5- 8—**East Liverpool, O.** Automobile Show.
5- 9—**Aurora, Ill.** Automobile Show.
7- 9—**Centralia, Wash.** Automobile Show.
8-15—**Albany, N. Y.** Automobile show at State Armory.
8-15—**Los Angeles, Cal.** Automobile Salon.
8-15—**Kansas City, Mo.** Automobile show.
8-15—**Allentown, Pa.** Lehigh Auto Trade Association Automobile Show.
10-15—**Indianapolis.** Automobile show.
10-15—**Denver, Col.** Automobile show.
10-16—**Sheboygan, Wis.** Automobile Show.
11-13—**Spartanburg, S. C.** Automobile Show
11-16—**Tacoma, Wash.** Automobile Show at Pierce County Airport.
12-15—**Mankato, Minn.** Automobile Show.
12-16—**Peoria, Ill.** Automobile Show at Armory
13-15—**Springfield, Ill.** Automobile Show
13-15—**Ansonia, Conn.** Automobile Show
15-22—**Indianapolis.** Automobile Show.
15-22—**Providence, R. I.** Automobile show.
15-22—**Canton, O.** Automobile Show.
17-22—**Omaha, Neb.** Automobile Show.
17-22—**Duluth, Minn.** Automobile Show.
19-22—**Watertown, N. Y.** Automobile Show.
20-22—**Holyoke, Mass.** Automobile Show.
22-Mar. 2—**Los Angeles, Cal.** Automobile Show.
24-March 1—**Camden, N. J.** Automobile Show.
24-March 1—**Des Moines, Ia.** Automobile show
25-Mar. 1—**Evansville, Ind.** Automobile Show at Memorial Coliseum.
25-March 2—**Seattle, Wash.** Automobile show.

MARCH

3- 7—**Boston, Mass.** Automobile Salon of fine cars.
12-14—**Enid, Okla.** Farm Machinery and Tractor Show.
16-30—**Nice, France.** Automobile exhibition.
20-22—**Muncie, Ind.** Automobile Show.
27-29—**Elkins, W. Va.** Automobile Show.

APRIL

12-27—**Milan, Italy.** Italian International Automobile Show.

CAR REGISTRATION MORE THAN TRIPLED IN DECADE

Washington, Jan. 20.—There are now three and a half times as many automobiles on American highways as there were ten years ago, while today five states, taken together, have more motor vehicles than existed in the entire country in 1920, exceeding the total for that year by nearly 1,000,000. Dr. Julius Klein, assistant secretary of commerce, declared in his weekly radio talk.

He ranked the five states as New York, California, Ohio, Illinois and Michigan.

There were 7,500,000 motor vehicles registered in the whole country at the beginning of 1920, while last year, production was more than 5,500,000 units, with a total registration in 1929 of 26,500,000, Dr. Klein pointed out, adding that 1929 exports amounted to more than 1,000,000 units.

UTICA EMPLOYMENT DOWN

Utica, Jan. 20.—Employment in the manufacturing plants of the four major industries in Utica showed a decline of 6.8 per cent. during December, with a corresponding decrease in the percentage of full time hours worked, as compared with November, according to the monthly employment report of the Industrial Association of Utica. The metal trades showed a decrease of 5.1 per cent. in employment and 7.4 per cent. in full time hours worked. Foundries dropped 3.6 per cent. in employment and 11.5 per cent. in working hours.

MONTREAL CAR EXHIBITS DOUBLE PREVIOUS SHOW

Montreal, Jan. 20.—More than twice as many new models as have been released in any other year are on display at the National Motor Show of Eastern Canada, which opened at noon Saturday in the Stadium, corner of Ontario Street and Delorimier Avenue. H. D. Jones, president of the Montreal Trade Automobile Association, Ltd., and Federal and provincial members of Parliament and city officials took part in the inauguration ceremonies.

All cars of Canadian make, 96 per cent. of the cars of American make and one European car—the Renault—are on exhibition.

Officials of the show committee are: H. D. Jones, president; T. R. Price, vice-president; Omer DeSerres, treasurer; F. A. Nancekivell, secretary; J. O. Linteau, P. O. Messier and J. E. Smith, directors.

Adelstan Levesque is the general manager.

500 CHEVROLET DEALERS MEET AT LITTLE ROCK

Little Rock, Ark., Jan. 20.—More than 500 Chevrolet dealers and salesmen met in Little Rock Friday for a business show, banquet and trade conference. The dinner event took place at Hotel Lafayette. This was a third of forty-two meetings scheduled in the nation. R. K. White, advertising manager; J. B. Blackmore, assistant sales promotion manager; M. B. Roys, zone sales manager; A. W. L. Gilpin, regional manager from St. Louis, were active in the conference. The 100-Car Club, star salesmen who sold more than 100 cars last year, also installed officers.

SPRINGFIELD, MASS., SHOW IN PROGRESS THIS WEEK

Springfield, Mass., Jan. 20.—Springfield's fifteenth annual automobile show opens tonight in the auditorium and continues through Saturday, January 25, closing at midnight. Harry Stacy is in charge.

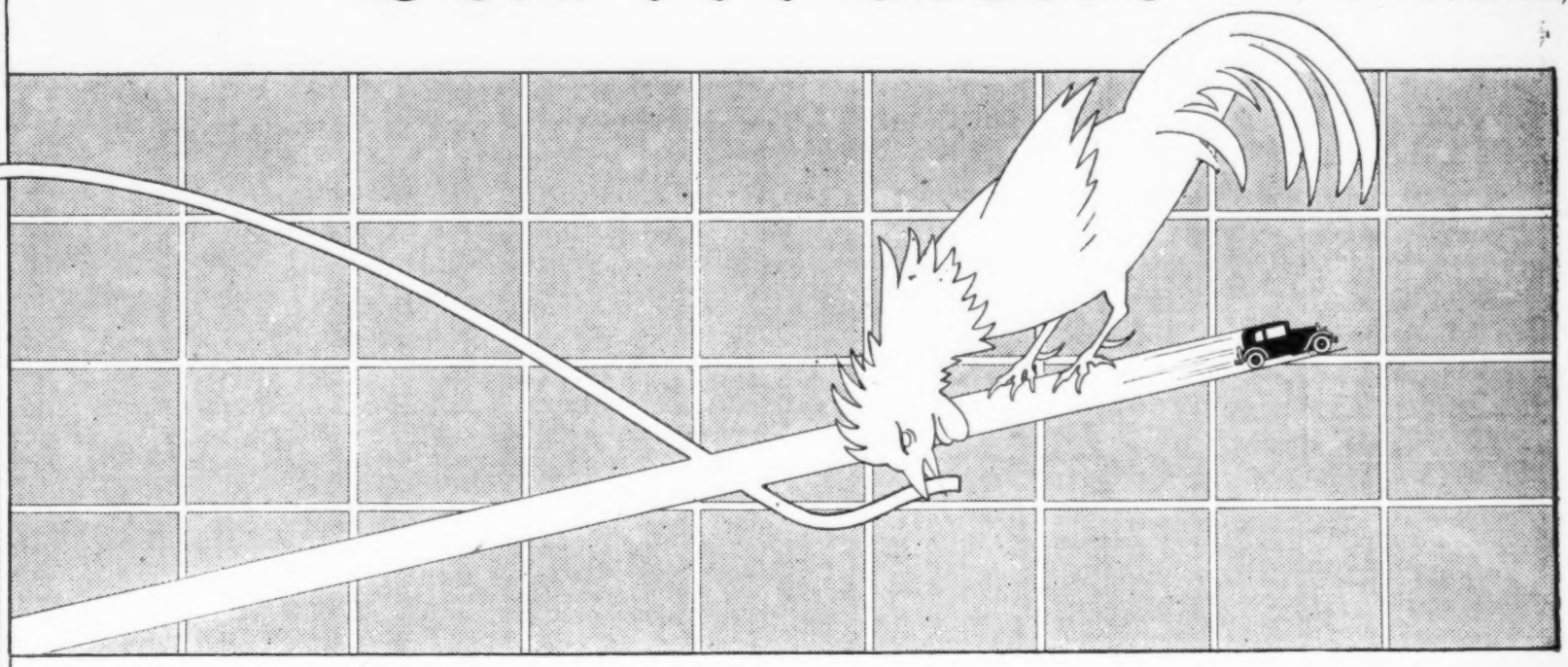
. . . . . Every day they break up a score of batteries just to fortify Willard quality . . . .

Each morning in the Willard plant a dozen factory executives assemble and inspect samples of the previous day's output. If they find any indication of a variation in quality, the entire day's production is withheld from shipment. It's a costly procedure, but it pays big dividends in the end by insuring that *Willard Quality is always the same.*

STORAGE BATTERIES
Willard
CLEVELAND·OHIO

AMERICAN AUSTIN

the bantam-car... that will fight the 1930 sales problem



Look over the 1930 sales situation.

1. Economy is the fashion of the day. Here's a car that costs less than $450 and can be run 10,000 miles on $56 worth of gas and oil—the American Austin.

2. Used cars are a glut on the market. Here's a car that can be sold to thousands of American families as a second car, because it costs so little to buy and to run, and will thus avoid trade-ins—the American Austin.

3. Traffic is crowded and parking space is scarce. Here's a car that will do over fifty in high and forty in second, can be parked in a tiny space and be turned completely around in a 32-foot street with a quarter turn of the steering wheel—the American Austin.

4. The demand for smartness and reliability is as great as ever. The American Austin chassis is a duplicate of the Austin of international fame, winner of 450 cups and medals for performance, while the bodies will be outstandingly smart in design.

Every part of the American Austin will be made in America by American workmen, financed and controlled by American capital. It will soon be in production. Do not fail to see the special dealer showing at the Hotel Sherman during the Chicago Automobile Show.

PRE-SHOWING FOR THE TRADE

HOTEL SHERMAN, CHICAGO SHOW WEEK

AMERICAN AUSTIN CAR CO., INC., 7300 WOODWARD AVE., DETROIT, MICH.

THE AMERICAN *Austin*

FRANCE TO BOOST DUTY 65 TO 100%

(Continued from Page 1)

which are to replace the present ad valorem rate of 45 per cent., is as follows (rates of minimum schedule, which applies to imports from the United States):—

COMPLETE PASSENGER CARS—From 850 francs per 100 kilos on cars weighing below 950 kilos each to 1,750 francs per 100 kilos on cars weighing over 1,850 kilos each, with five seperate classifications according to weight.

PASSENGER CAR CHASSIS—From 850 francs per 100 kilos when weighing below 700 kilos each, to 1,750 francs per 100 kilos on those weighing more than 1,500 kilos each, also with five separate classfications according to weight.

PASSENGER CAR BODIES—Eleven hundred francs per 100 kilos.

On all commercial cars complete, commercial chassis alone, or commercial bodies alone, 750 francs per 100 kilos.

Further study will be necessary to determine the full effect of the changes, it was explained at the Department of Commerce today.

It was pointed out unofficially that the proposed schedules indicate that the obvious intent of the French government is to protect the interests o fthe Citroen and other low-priced French cars against further invasion of the Ford and Chevrolet cars from the United States.

AMERICAN ROAD BUILDERS NAME VAN DUZER AS HEAD

Atlantic City, N. J., Jan. 20.—The selection of William A. Van Duzer of Harrisburg, Pa., assistant chief engineer of the Pennsylvania Department of Highways, as president of the American Road Builders Association for the ensuing year, was formally ratified at the concluding session of the twenty-seventh annual meeting of the organization, held in the municipal auditorium.

Van Duzer, who succeeds Major Frederick A. Reimer of East Orange, N. J., will be installed with the other new officers next May at Washington, national headquarters of the association. Vice-presidents for 1930 are: J. R. Draney, Natural Rock Asphalt Corporation, Louisville, Ky.; Henry G. Shirley, president of the Austin-Western Road Machinery Company, Chicago; Samuel Hill, honorary life president, Washington State Good Roads Association, Seattle; James M. McDonald, consulting and road paving expert of New Haven, Conn., was re-elected treasurer.

NEW NASH DISTRIBUTOR FOR PACIFIC NORTHWEST

Seattle, Wash., Jan. 20.—Official announcement was made this week of a new Nash distributorship in Seattle, the Nash Washington Company having been formed to succeed the Green Nash Corporation.

A. B. Graham is president of the new Nash corporation, which will distribute cars in this territory, including all of Washington northren Idaho, western Montana and Alaska. A branch will be located in Spokane to handle most of the business east of the Cascade Mountains.

STATUS OF CAR FINANCING FIRMS IN NEBRASKA TOLD

Lincoln, Neb., Jan. 20.—Any automobile financing concern in the state of Nebraska whose interest charges exceed 10 per cent. falls within the legal classification of a chattel loan company and is required by law to procure a license from the secretary of state, paying a yearly fee of $60, according to a notice just issued by Secretary of State Marsh. A dealer in this line who neglects to secure the license may be fined any amount from $100 to $1,000 and imprisoned in the county jail until the fine and costs are paid.

Classified Advertising

Classified Rates 5c Per Word

AN UNUSUAL OPPORTUNITY

Service manager, 28 years with industry. Experienced executive. A proven builder of business. Now employed. Would like change for position with larger scope. Box 255, Automotive Daily News, Graybar Bldg., New York City.

MAJOR SPECIFICATIONS AND MECHANICAL DETAILS

Make and Model	Weight—5-P. Sedan	Wheel Base	Engine Make	Fan Belt Type	Thermostat Used	Valve Arrangement	Cylinders	Bore and Stroke	Piston Disp.	Compression Ratio	Tax H. P.	Brake, H.P. and Peak R. P. M.	Fist. Make or Mat	No. Main Br.	Oil Purifier	Fuel Clean'r	Carburetor	Air Cleaner
Auburn 6-85	3255	120	Lyc	V	Yes	L	6	2 7/8 x4 3/4	185	*5.16	19.8	65@3400	*Alum	4			Sch	
Auburn 8-95	3510	125	Lyc	V	Yes	L	8	2 7/8 x4 3/4	246	*5.15	26.4	93@3300	*Alum	5	Pur	A C	Sch	
Auburn 125	3908	130	Lyc	V	Yes	L	8	3 1/4 x4 1/2	299	*5.25	33.8	125@3600	*Alum	5	Pur	A C	Sch	
Austin Bantam	1000	75	Own			L	4	2 1-5x3										
Blackhawk 6	4320	127 1/2	Own	V	Bish-Bab	O		3 3/8 x4 1/2	241.5	5.0	27.3	85@3150	*Alum	7	Wal	A C	Zen	A M
Blackhawk 8	4185	127 1/2	Own	V	Bish-Bab	L		3 x4 3/4	268.5	5.50	28.8	88@3200	*Alum	5		A C	Zen	A M
Buick 40	3881	118	Own	V	Yes	O	6	3 1/16 x4 5/8	257.5	4.51	28.4	80 1/2@2800	C I	4	A C	A C	Mar	A C
Buick 50 and 60	4443	124-132	Own	V	Yes	O	6	3 3/4 x5	331.0	4.37	33.75	98@2800	C I	4	A C	A C	Mar	A C
Cadillac 353	5055	*210	Own	V	Yes	LV	8	3 3/8 x4 1/2	353	4.7	36.5	95@3000	C I	3	A C	Gas	Own	
Cadillac 452		148	Own	V	Yes	O	16	3 x4	452.0	5 1/2	57.5	165@3400	N C I	5	A C	Gas	Own	None
Chevrolet	2500	107	Own	V	Yes	O	6	3 1/8 x3 3/4	194.0	5.01	26.3	50@2000	C I	3		A C	Car	A C
Chrysler 77	3770	*177 1/2	Own	V	Yes	L	6	3 3/8 x5	268.4		27.34	93@3200	*Alum	7	Pur	A C	Str	Un
Chrysler 70	3435	*168 1/2	Own	V	Yes	L	6	3 3/8 x5	268.4		27.34	93@3200	*Alum	7	Pur	A C	Str	Un
Chrysler 66	2850	*163 1/4	Own	V		L	6	3 1/8 x4 3/8	218.6	5.0	23.43	68@3200		7		A C		
Cord (Fr. Wh. Dr.)	4530	137 1/2	Lyc	V		L	8	3 1/4 x4 1/2	298.6	5.25	33.8	55@3600	*Alum	5	Pur	A C	Sch	
De Soto 6	2645	*169	Own	V	Yes	L	6	3 x4 1/8	174.9	5.2	21.6	125@3600	*Alum	5	Pur	A C	Sch	
De Soto 8		*163	Own	V	Yes	L	8	2 7/8 x4	207.7		26.45	72@	Alum	5	Pur		Str	
Dodge Six	2900	112	Own	V	Bish-Bab	L	6	3 3/8 x3 3/4	208	5.18	27.3	58@3000	*Alum	7	Pur	A C	Str	Han
Dodge Senior	3572	120	Own	V		L	6	3 3/8 x4 1/2	241.5	5.5	27.3	78@3000	*Alum	7	Pur	Yes	Str	Un
Dodge Six D D		*155 7/8	Own	V		L	6	3 1/8 x4 1/8	189.8	5.2	23.4	61@	Alum	4	No	No	Str	
Dodge 8		*163	Own	V		L	8	2 7/8 x4 1/4	220.7	5.2	26.5	76@	Alum	5	Yes	No	Str	
Durant 40	2395	107	Con	F		L	4	3 3/8 x4 1/4	152	4.23	18.2	36@2400	*Alum	3			Til	
Durant 60	2630	109	Con	F	Bish-Bab	L	6	2 7/8 x4 3/4	185	5.44	19.8	43@2800	*Alum	4	H-W		Til	
Durant 6-14	2200	*157	Con	V	Bish-Bab	L	6	3 1/4 x4	199	5.32	25.4	58@3100	*Alum	4	A C	A C	Str	A C
Durant 6-17		*158 3/16	Con	V	Bish-Bab	L	6	3 3/8 x4 5/8	248	5.30	27.34	70@3000	*Alum	7	A C	A C	Str	A C
Elcar 6-75	2942	117	Lyc	V	Yes	L	6	2 7/8 x4 3/4	185	5.25	19.8	61@3000	*Alum	4	Yes	Gas	Sch	
Elcar 140 and 130		135-130	Lyc	V	Yes	L	8	3 3/8 x4 1/2	322	5.25	36.45	140@3300	*Alum	5	Pur	Gas	Sch	
Elcar 8-95-96	3299	123	Lyc	V	Yes	L	8	2 7/8 x4 3/4	246.7	5.25	26.5	90@3000	*Alum	5		Gas	Sch	
Erskine	2900	114	Own	V	Yes	L	6	3 1/4 x4 1/8	205.3	5.20	25.4	70@3200	C I	4	Pur	Ste	Sch	
Essex Super Six		119-126	Own	V		L	6	2 3/4 x4 1/2	160.4	5.8	18.15	60@3600	Alum	3		Ste	Mar	A C
Ford A	2336	103 1/2	Own	V		L	4	3 7/8 x4 1/4	200.5	4.22	24.03	40@2200	Alum	3		A C	Zen	
Franklin 145	3930	125	Own		Bish-Bab	O	6	3 1/2 x4 3/4	274	5.3	29.4	87@3000	Alum	7	A C	A C	Str	A C
Franklin 147	4060	132	Own		Bish-Bab	O	6	3 1/2 x4 3/4	274	5.3	29.4	87@3000	Alum	7	A C	A C	Str	A C
Gardner 136	3330	122	Lyc	V	Yes	L	6	2 7/8 x4 3/4	185	5.05	19.8	70@3500	*Alum	4	Pur	Gas	Sch	
Gardner 140	3500	125	Lyc	V	Yes	L	8	2 7/8 x4 3/4	246.6	5.15	26.5	90@3300	*Alum	5	Pur	Gas	Sch	A M
Gardner 150	3890	130	Lyc	V	Yes	L	8	3 1/4 x4 1/2	298.6	5.25	33.8	126@3300	*Alum	5	Pur	Gas	Sch	A M
Gard'r (Fr.Wh.Dr.)								3 3/8 x4 5/8	248.0			80@						
Graham Std. 6		115	Own	F	Yes	L	6	3 1/8 x4 1/2	207	5.41	23.44	66@3200	*Alum	7	No	A C	D L	A C
Graham Spl. 6		115	Own	F	Yes	L	6	3 1/4 x4 1/2	224	5.49	25.35	76@3400	*Alum	7	A C	A C	D L	A C
Graham Std. 8		122	Own	V	Yes	L	8	3 1/4 x4 1/2	298	5.20	33.80	100@3400	*Alum	5	A C	A C	D L	A C
Graham Spl. 8		122	Own	V	Yes	L	8	3 1/4 x4 1/2	298	5.20	33.80	100@3400	*Alum	5	A C	A C	D L	A C
Graham Cust. 8	4300	127	Own	F	Bish-Bab	L	8	3 3/8 x4 1/2	322	5.54	36.45	120@3200	*Alum	5	A C	A C	John	A C
Graham Cust. 8	4405	137	Own	F	Bish-Bab	L	8	3 3/8 x4 1/2	322	5.54	36.45	120@3200	*Alum	5	A C	A C	John	A C
Hudson Super 8		119-126	Own	V		L	8	2 3/4 x4 1/2	213.8	5.8	24.2	80@3600	Alum	5		Ste	Mar	A C
Hupmobile S		111	Own	V	Yes	L	6	3 1/4 x4 1/4	211.6	4.8	25.3	70@3200	C I	4	Pur	Ste	Str	Han
Hupmobile C	3725	121	Own	V	Bish-Bab	L	8	3 x4 3/4	268.6	5.05	28.8	100@3200	C I	5	Han	Gas	Str	A M
Hupmobile H		*175	Own		No	L	8	3 1/2 x4 3/4	365.0	5.2	39.2	133@3400	Alum	5		Ste	Str	A M
Jordan Stand. 8	3590	120	Con	V	Bish-Bab	L	8	2 7/8 x4 3/4	246.7	5.1	26.5	80@3000	*Alum	5	Ste	A C	Str	A C
Jord'n G. Ninety 8	3600	125	Con	V	Pines	L	8	3 x4 3/4	268.6	5.1	28.9	85@3200	*Alum	5	Ste	Ste	Str	A M
Kissel 6-73	3260	117	Own	V	Leech	L	6	2 7/8 x4 3/4	185	5.15	19.8	70@3500	*Alum	4	A C	Gas	Sch	A C
Kissel 8-95	3495	125	Own	V	Leech	L	8	2 7/8 x4 3/4	246	5.15	26.5	95@3400	*Alum	5	A C	Gas	Sch	A C
Kissel 8-126	4450	132-139	Own	V	Leech	L	8	3 1/4 x4 1/2	298	5.35	33.8	126@3600	*Alum	5	A C	Gas	Sch	A C
La Salle	4645	*201	Own	V	Yes	O	8	3 3/8 x4 1/2	340	4.7	35.1	90@3000	C I	3	A C	Gas	Own	
Lincoln	5010	136	Own	V		L	8	3 1/2 x5	384	4.8	39.2	90@2800	Alum	5		Own	Str	Un
Marmon 69	2897	114	Own	V	Yes	L	8	2 13/16 x4 1/4	211	5.25	25.3	84@3400	Alum	5	A C	A C	Str	A C
Marmon 79	3182	120	Own	V	Yes	O	8	2 13/16 x4	217	5.50	27.6	86@3400	Alum	5	A C	A C	Str	A C
Marmon Big 8		*202	Own	V	Pines	L	8	3 3/4 x4 3/4	315.2	5.50	33.8	125@3400	Alum	5	A C	A C	Sch	A C
Marquette 30	3076	114	Own	V	Yes	L	6	3 1/8 x4 3/8	212.8	5.2	23.4	67 1/2@3000	C I	4	A C	A C	Mar	A C
Nash Single Six	2850	114 1/2	Own	V	Pines	L	6	3 1/8 x4 3/8	201.3	5.00	23.4	60@2800	*Alum	7	A C	A C	Car	A C
Nash Twin Ig. 6	3535	118-128 1/4	Own	V	Pines	L	6	3 3/8 x4 1/2	242	5.00	27.3	74@2800	*Alum	7	A C	A C	Mar	A C
Nash Twin Ig. 8	4000	124-133	Own	V	Pines	L	8	3 1/4 x4 1/2	298.6	5.25	33.8	100@3200	*Alum	9	A C	A C	Mar	A C
Oakland V-8			Own	V	Yes	H	8	3 7/16 x3 7/8	251.0	5.10		85@	C I	3	A C	A C	Mar	A C
Oldsmobile	2930	113 1/2	Own	V		L	6	3 3/16 x4 1/8	197.5	5.2	24.4	62@3000	C I	4	A C	A C	Sch	A C
Packard 726-733	*4265	127 1/2-134 1/2	Own	V	Pines	L	8	3 3/4 x5	320		32.5	90@3200	*Alum	7	Yes	Yes	Own	
Packard 740-745	*4560	140 1/2-145 1/2	Own	V	Pines	L	8	3 1/2 x5	384.8		39.2	106@3200	*Alum	9	Yes	Yes	Own	
Peerless B		125	Own	V	Pines	L	8	3 3/8 x4 1/2	322	5.0	36.4	120@3200	*Alum	5	Pur	A C	Sch	A C
Peerless C		138	Own	V	Pines	L	8	3 3/8 x4 1/2	322	5.0	36.4	120@3200	*Alum	5	Pur	A C	Sch	A C
Pierce-Arrow 132		132 3/8	Own	V	Yes	L	8	3 3/8 x4 3/4	340	5.0	36.45	115@3000	*Alum	9	Yes	Yes	Str	Yes
Pierce-Arrow 125		139	Own	V	Yes	L	8	3 1/2 x4 3/4	366	5.0	39.2	125@3000	*Alum	9	Yes	Yes		Yes
Pierce-Arrow 126		144	Own	V	Yes	L	8	3 1/2 x5	385	5.0	39.2	132@3000	*Alum	9	Yes	Yes		Yes
Plymouth	2555	*169	Own	V		†L	4	3 5/8 x4 1/4	175.4	4.6	21.03	45@2800	Alum	3			Car	Un
Pontiac		110	Own	V	Yes	L	6	3 1/8 x3 7/8	200.0	4.9	26.3	60@3000	S St	3		A C	Mar	
Reo 15	3280	115	Con	V	Yes	L	6	3 3/8 x4	214.7	5.5	27.3	60@2800	*Alum	7		A C	Sch	Un
Reo 20		120	Own	V	Yes	L	6	3 3/8 x5	268.3	5.3	27.3	80@3200	Alum	7	Han		Sch	Un
Reo 25		124	Own	V	Yes	L	6	3 3/8 x5	268.3	5.3	27.3	80@3200	Alum	7	Han		Sch	Un
Roosevelt	2950	*172	Own	V	Yes	L	8	2 3/4 x4 1/4	201.9	5.25	24.2	72@3200	Alum	7			Str	
Ruxton Fr.Wh.Dr.	4000	130	Own	V	Yes	L	8	3 x4 3/4	268.6	5.09	28.8	100@3200	*Alum	5	Pur	A C	Zen	A M
Studebaker Dict. 6	3085	115	Own	V	Yes	L	6	3 3/8 x4 1/8	221.4	4.8	27.0	68@3200	C I	4	Pur	A C	Str	
Studebaker Dict. 8	3085	115	Own	V	Yes	L	8	3 3/16 x3 3/4	221.0	5.0	30.0	70@3200	*Alum	9	Pur	A C	Str	A M
Studebaker Com. 6	3410	120	Own	V	Yes	L	6	3 3/8 x4 5/8	248.3	4.8	27.3	75@3000	C I	4	Han	A C	Str	
Studebaker Com. 8	3440	120	Own	V	Pines	L	8	3 1/16 x4 1/4	250	5.1	30.0	80@3600	*Alum	9	Han	A C	Str	A M
Studebaker Pres. 8	*4200	125-135	Own	V	Pines	L	8	3 1/2 x4 3/8	337	5.05	39.2	115@3200	*Alum	5	Han	A C	Str	A M
Stutz	4718	134 1/2-145	Own	C	Yes	O	8	3 1/4 x4 1/2	322	5.25	36.5	80@3300	*Alum	9	Wal	Gas	Zen	A M
Viking Eight	3650	125	Own	V	Yes	H	8	3 3/8 x3 5/8	259.5	5.1	36.5	80@3200	C I	3	Own	A C	Joh	A C
Windsor 6-69	3195	120	Con	V	Yes	L	6	2 7/8 x4 3/4	185	4.78	19.8	47.5@2600	*Alum	4	A C		Str	
Windsor 6-72	2930	120	Con	V	Yes	L	6	3 3/8 x4	215	4.94	27.3	66@3200	*Alum	7	A C		Str	
Windsor 6-77	2930	120	Con	V	Yes	L	6	3 3/8 x4	215	4.94	27.3	66@3200	*Alum	7	A C		Str	
Windsor 8-85	3600	125	Con	V	Yes	L	8	3 x4 3/4	269	5.0	28.8	88@3200	*Alum	5	A C	Gas	Str	A M
Windsor 8-92	3600	125	Con	V	Yes	L	8	3 x4 3/4	269	5.0	28.8	88@3200	*Alum	5	A C	Gas	Str	A M
Whippet Four	2412	103 1/4	Own	V		L	4	3 1/8 x4 3/4	145.7	5.4	15.6	40@3200	*Alum	3			Til	
Willys Six	2675	110	Own	V	Var	L	6	3 1/4 x3 7/8	193	5.6	25.3	65@3400	C I	4		Til	Til	Til
Willys-Knt. 66-B	3934	120	Own	V		K	6	3 3/8 x4 3/4	255	5.5	27.3	82@3200	*Alum	7	Ski	Til	Til	Til
Willys-Knt. 70-B	3015	112 1/2-115	Own	V	Var	K	6	2 13/16 x4 3/8	177.9	5.5	20.7	53@3000	*Alum	7	Ski	Til	Til	Til

ABBREVIATIONS

Wheel Base—*Over all length of chassis instead of wheel base.

Engine Make—Con, Continental; Lyc, Lycoming.

Fan Belt Type—V, V-type; F, flat; C, cone.

Thermostat—Bish-Bab, Bishop & Babcock; Leech, Leech Fulton; Pines, Pines Winterfront.

Valve Arrangement—L, L head; H, horizontal; O, overhead; K, sleeve valve.

Piston Material—*Alum, aluminum with invar struts; Alum, aluminum alloy; C I, cast iron; S St, sheet steel.

Oil Purifier—Pur, Purolator; Wal, Wall; H W, Rich Tool Company; Han, Handy; A C, A C Spark Plug Company; Ski, Skinner.

Fuel Cleaner—A C, A C Spark Plug Company; Gas, Gascolator; Ste, Stewart-Warner; Til, Tillotson.

Carburetor—Sch, Wheeler Schebler; Str, Stromberg; Til, Tillotson; Mar, Marvel; John, Johnson; Car, Carter; D L, Detroit Lubricator; Zen, Zenith.

Air Cleaner—A C, A C Spark Plug Company; A M, Air Maze; Un, United; Han, Handy; Til, Tillotson.

Front End Drive—Link, Link Belt; Tex, Textolite; Cel, Celeron; Ram, Ramsey; Whit, Whitney Chain; Diam, Diamond Chain.

Ignition, Generator and Starter—Aut-L, Auto-Lite; Del-R, Delco-Remy; N E, Northeast.

Clutch—Borg, Borg & Beck; Br-L, Brown-Lipe; Rock, Rockford Machine; Russ, Russel.

Gearset—War G, Warner Gear Company; Detr, Detroit Gear; Mun, Muncie Gear. *Indicates Bendix starter drive used.

Universals—Un P, Universal Products Company, Spic, Spicer Mfg. Corporation; M M, Mechanics Machine; Cle, Cleveland.

Rear Axle—Col, Columbia; Sal, Salisbury; Clar, Clark Equipment Company; Tim, Timken.

Brakes—H, Hydraulic; M, Mechanical; S D, Steeldraulic; Bendix, Bendix Brake Corporation.

Steering Gear—Ross, Ross Gear and Tool Company; Gem, Gemmer; Sag, Saginaw; War, Warner.

Rear Springs—S, semi-elliptic.

Spring Shackles—Tryon, Tryon Spring Shackle Company; Rub B, rubber block; Sil B, silent block; Faf, Fafnir.

Chassis Lubricator—Alem, Alemite; Al-Z, Alemite Zerk; Bijur, Bijur chassis lubricator; Cen, central magazine.

SPROLES MOTOR FREIGHT LINES BUY IN FRANCHISE

Fort Worth, Tex., Jan. 20.—Purchase of the Union Transfer and Motor Freight Line by the Sproles Motor Freight Lines is announced. Purchase was made from B. K. Isaacs of Fort Worth, trustee in bankruptcy.

OF PRESENT AMERICAN PASSENGER CAR MODELS

Make and Model	Front End Drive	Ignition System	Gen. and Starter	Clutch	Gear Set and Speeds	Universals	Rear Axle	Ratio	Brakes	Steering Gear	Rear Springs	Spring Shackles	Chassis Lubric.	Tires
Auburn 6-85	Link	Del-R	*Del-R	Long	War-G 4	Un P	Col ½	4.9	H	Ross	S 56¾	Own	Bijur	18x5.50
Auburn 8-95	Link	Del-R	*Del-R	Long	War-G 4	Un P	Col ½	4.7	H	Ross	S 56¾	Own	Bijur	18x6.00
Auburn 125	Link	Del-R	*Del-R	Long	Detr 4	Un P	Col ½	4.45	H	Ross	S 56¾	Own	Bijur	18x6.50
Austin Bantam					3				Bendix		C			3.75x26
Blackhawk 6	Link	Del-R	Del-R	Borg	*Detr 4	Un P	Sal ½	4.75	H	Gem	S 60	Own	Bijur	31x6.00
Blackhawk 8	Link	Del-R	Del-R	Borg	*Detr 4	Un P	Sal ½	†4.75	H	Gem	S 60	Own	Bijur	31x6.00
Buick 40	Tex	Del-R	Del-R	Own	Own 3	Own	Own ¾	4.45	M	Sag	S 55	Own	Al-Z	23x5.50
Buick 50 and 60	Tex	Del-R	Del-R	Own	Own 3	Own	Own ¾	4.45	M	Sag	S 58¼	Own	Al-Z	19x6.50
Cadillac 353	Chain	Del-R	Del-R	Own	Own 3	Spic	Own ¾	5.08	Own-M	Own	S 60	Own	Alem	19x7.00
Cadillac 452	Chain	Del-R	Del-R	Own	Own 3	Spic	Own ¾	4.39	Own	Own	S 60	Own	Alem	19x7.00
Chevrolet		Del-R	*Del-R	Own	Own 3	Own	Own ⅛		M	Own	S 54	Own	Alem	4.75x19
Chrysler 77	Chain	Del-R	Del-R	Own	Own 4	Un P	Own ½	3.82	H	Ross	S 58	Rub B	Al-Z	18x6.00
Chrysler 70	Del-R	Chain	Del-R	Own	Own 4	Un P	Own ½	4.10	H	Ross	S 57¾	Rub B	Al-Z	18x5.50
Chrysler 66	Chain	Del-R	Del-R	Own	Own 3	Un P	Own ½	4.70	H		S 57¾	Sil B		18x5.50
Cord (Fr. Wh. Dr.)	Link	Del-R	Del-R	Long	Detr 3	UnP&MM	*Col ¾	4.41	H	Gem	S 62	Own	Bijur	18x7.00
De Soto 6	Chain	N E	*N E	Borg	Own	U P	Own ½	4.7	H	War	S 53½	Tryon	Al-Z	5.00x19
De Soto 8	Chain	N E	N E	Borg	Own 3		½	4.9	H		S 54⅝	Tryon	Al-Z	5.25x19
Dodge Six	Chain	N E	*N E	Borg	Own 3	Spic	Own ½	4.72	H	Gem	S 54	Tryon	Al-Z	19x5.50
Dodge Senior	Chain	N E	*N E	Borg	Own 4	M M	Own ½	4.45	H	Gem	S 55½	Own	Al-Z	19x6.00
Dodge Six D D	Chain	N E	N E	Borg	Own 3		Own ½	4.9	H	Gem	S 53⅝	Own	Al-Z	5.00x19
Dodge 8	Chain	N E	N E	Borg	Own 3	Spic	Own ½	4.6	H	Gem	S 54⅝	Own	Al-Z	5.50x18
Durant 40	Chain	Aut-L	*Aut-L	Own	Own 3	Spic	Own ½	4.44	Bendix	Own	S 53¾	Tryon	Alem	28x4.75
Durant 60	Chain	Aut-L	*Aut-L	Own	Own 3	Spic	Own ½	4.44	Bendix	Own	S 53¾	Tryon	Alem	29x5.00
Durant 614	Chain	Aut-L	Aut-L	Borg	Own 3	Spic	Own ½	4.44	S D	Own	S 55	Tryon	Alem	5.00x29
Durant 617	Chain	Aut-L	Aut-L	Borg	War-G 4	Spic	Own ½	3.72	S D	Own	S 55	Tryon	Alem	5.50x29
Elcar 6-75	Link	Del-R	*Del-R	Long	War-G 3	Spic	Sal ½		H	Ross	S 53½	Belf	Alem	29x5.00
Elcar 140 and 130	Link	Del-R	Del-R	Long	*War-G 4	Spic	Sal ½		H	Ross	S 57	Belf		7.00x30
Elcar 8-95-96	Link	Del-R	*Del-R	Long	*War-G 3	Spic	Sal ½		H	Ross	S 56	Belf	Alem	29x5.50
Erskine Six	Whit	Del-R	*Del-R	Long	War-G 3	Spic	Own ½	4.78	Bendix	Ross	S 54	Tryon	Alem	5.25x19
Essex Super Six	Chain	Aut-L	*Aut-L	Own	Own 3	Spic	Own ½	5.4	Bendix	Gem	S 54⅝	Own	Alem	5.00x19
Ford A	Cel	Own	*Own	Own	Own 3	Own	Own ¾	3.7	M	Own	S Tr	Own	Al-Z	4.75x19
Franklin 145	Ram	Del-R	*Del-R	Br-L	Detr 4	Spic	Own ½	4.54	H	Gem	El 42		Al-Z	6.50x19
Franklin 147	Ram	Del-R	*Del-R	Br-L	*War-G 3	Spic	Own ½	4.54	H	Gem	El 42		Al-Z	6.50x19
Gardner 136	Link	Del-R	*Del-R	Borg	*War-G 4	Spic	Col ½	4.45	H	Ross	S 54	O-N	Alem	5.50x29
Gardner 140	Link	Del-R	*Del-R	Borg	War-G 3	Spic	Col ½	4.45	H	Ross	S 54	O-N	Alem	5.50x29
Gardner 150	Link	Del-R	*Del-R	Borg	War-G 3	Spic	Col ½	4.45	H	Ross	S 57	O-N	Alem	6.50x30
Gard'r (Fr. Wh. Dr.)						MM								
Graham Std. 6	Link	Del-R	Del-R	Long	War-G 3	Un P	Clar ½	4.7	H	Ross	S 54	Tryon	Al-Z	5.25x19
Graham Spl. 6	Link	Del-R	Del-R	Long	War-G 4	Un P	Sal ½	3.91	H	Ross	S 54	Rub	Al-Z	5.50x18
Graham Std. 8	Link	Del-R	Del-R	Long	War-G 3	Un P	Sal ½	4.45	H	Ross	S 58	Rub	Al-Z	6.00x18
Graham Spl. 8	Link	Del-R	Del-R	Long	War-G 4	Un P	Sal ½	3.90	H	Ross	S 58	Rub	Al-Z	6.00x18
Graham Cust. 8	Link	Del-R	Del-R	Long	War-G 4	Un P	Clar ½	3.64	H	Ross	S 58	Own	Bijur	6.50x19
Graham Cust. 8	Link	Del-R	Del-R	Long	War-G 4	Un P	Clar ½	3.92	H	Ross	S 58	Own	Bijur	6.50x19
Hudson Super 8	Chain	Aut-L	*Aut-L	Own	Own 3	Spic	Own ½	4.6	Bendix	Gem	S 54⅝	Own	Alem	5.50x18
Hupmobile S	Chain	Aut-L	*Aut-L	Borg	Detr 3	M M	Sal ½	4.7	S	Ross	S 53	Tryon	Alem	29x5.25
Hupmobile C	Chain	Aut-L	*Aut-L	Long	Detr 3	Un P	Own ½	4.36	S	Ross	S 54	Own	Alem	31x6.00
Hupmobile H		Aut-L	*Aut-L	Long	Detr 3	Un P	Own ½	4.07	S D	Ross	S 57	Own	Alem	6.50x19
Jordan Standard 8	Chain	Aut-L	*Aut-L	Long	War-G 3	Cle	Col ½	4.9	H	Gem	S 55¾	O-N	Alem	5.50x28
Jordan Grt. Ninety 8	Chain	Aut-L	*Aut-L	Long	War-G 3	Cle	Col ½	4.45	H	Gem	S 55¾	O-N	Alem	6.00x30
Kissel 6-73	Link	Del-R	*Del-R	Borg	War-G 3	M M	Col ½	4.89	H	Ross	S 57	Rub B	Alem	6.00x30
Kissel 8-95	Link	Del-R	*Del-R	Borg	War-G 4	M M	Col ½	3.92	H	Ross	S 57	Rub B	Alem	6.00x30
Kissel 8-126	Link	Del-R	*Del-R	Borg	War-G 4	M M	Tim ½	4.09	H	Ross	S 60	Rub B	Alem	7.00x30
La Salle 340	Chain	Del-R	Del-R	Own	Own 3	Spic	Own ¾	4.54	Own-M	Own	S 58	Own	Alem	6.50x19
Lincoln	Chain	Del-R	Del-R	Own	Own 3	Spic	Tim F	4.58	Bendix	Own	S 60	Own	Alem	6.75x32
Marmon 69	Diam	Del-R	*Del-R	Rock	War-G 3	Spic	Sal ½	4.9	Bendix	Ross	S 56⅜	Rub B	*Al-Z	29x5.50
Marmon 79	Diam	Del-R	Del-R	Rock	Mun 3	Spic	Sal ½	4.9	Bendix	Ross	S 56⅜	Rub B	*Al-Z	31x6.00
Marmon Big 8	Diam	Del-R	Del-R	Rock	War-G 4	Spic	Sal ½	4.45	Bendix	Ross	S 60	Rub B	*Al-Z	31x5.50
Marquette 30	Link	Del-R	Del-R	Own	Own 3	MM	Own ½	4.54	M	Sag	S 54½	Tryon	Al-Z	28x5.25
Nash Single Six		Aut-L	*Aut-L	Borg	Own 3	Fab	Own ½	4.7	S	Ross	S 50⅞	Tryon	Alem	5.00x29
Nash Twin Ig. 6		*Aut-L	*Aut-L	Borg	Own 3	*Own	Own ½	4.5	Bendix	Gem	S 54	Own	Bijur	*5.50x29
Nash Twin Ig. 8		*Aut-L	*Aut-L	Borg	Own 3	*Own	Own ½	4.5	Bendix	Gem	S 56¾	Own	Bijur	6.50x31
Oakland V-8		Del-R	Del-R		3	MM	⌐ ½	4.42	H	Sag	S 54½	Tryon		5.50x28
Oldsmobile	Var	Del-R	Del-R	Borg	Mun 3	Un P	Own ½	4.41	Own	Sag	S 54½	Tryon	Alem	5.25x28
Packard 726-733	Chain	N E	*Dyn	Own	Own 4	MM	Own ½		Own	Own	S 56	Own	Cen	6.00x20
Packard 740-745	Chain	N E	*Dyn	Own	Own 4	MM	Own ½		Own	Own	S 62	Own	Cen	7.00x19
Peerless B	Link	Aut-L	*Aut-L	Rock	*War-G 4	Spic	Sal ½	4.45	Bendix	Ross	S 60	Rub	Alem	6.00x31
Peerless C	Link	Aut-L	*Aut-L	Rock	*War-G 4	Spic	Sal ½	4.45	Bendix	Ross	S 60	Rub	Alem	6.50x31
Pierce-Arrow 132	Chain	Del-R	Del-R	Long	Own 4	Spic	Own ½	4.42	Bendix	Gem	S 60	Faf		6.50x19
Pierce-Arrow 125	Chain	Del-R	Del-R	Long	Own 4	Spic	Own ½	4.42	Bendix	Gem	S 60	Faf		7.00x18
Pierce-Arrow 126	Chain	Del-R	Del-R	Long	Own 4	Spic	Own ½	4.42	Bendix	Gem	S 60	Faf		7.00x18
Plymouth	Cel	Del-R	Del-R	Rock	Own 3	Own	Own ½	4.3	H	War	S 53½	Tryon	Al-Z	4.75x19
Pontiac	Chain	Del-R	Del-R	Own	Own 3	M M	Own ½	4.42	M	Sag	S 54	Tryon	Al-Z	5.00x29
Reo 15	Link	Del-R	Del-R	Borg	War-G 3	Spic	Sal ½	4.45	H	Ross	S 55	Rub B	Al-Z	30x6.00
Reo 20	Chain	Del-R	Del-R	Russ	Own 3	Spic	Own ½	4.07	H	Ross	S 55	Rub	Al-Z	6.00x18
Reo 25	Chain	Del-R	Del-R	Long	Own 3	Spic	Own ½	4.42	H	Ross	S 55	Rub	Al-Z	6.50x18
Roosevelt	Diam	Del-R	*Del-R	Long	War 3	Spic	Sal ½	4.9	M	Ross	S 54⅛	Tryon	Al-Z	29x5.00
Ruxton (Fr. Wh. Dr.)	Link	Aut-L	Aut-L	Long	Own 3	Own	Own	4.25	H	Gem	S 55	Own	Alem	31x6.00
Studebaker Dict. 6	Whit	Del-R	Del-R	Long	War-G 3	Spic	Own ½	4.78	Bendix	Ross	S 54	Own	Alem	5.50x19
Studebaker Dict. 8	Var	Del-R	Del-R	Long	War-G 3	Spic	Own ½	5.11	Bendix	Ross	S 54	Own	Alem	5.50x19
Studebaker Com. 6	Whit	Del-R	Del-R	Long	War-G 3	Spic	Own ½	3.91	Bendix	Ross	S 54	Faf	Al-Z	5.50x19
Studebaker Com. 8	Var	Del-R	Del-R	Long	War-G 3	Spic	Own ½	4.7	Bendix	Ross	S 54	Faf	Al-Z	5.50x19
Studebaker Pres. 8	Var	Del-R	Del-R	Long	Own 3	Spic	Own ½	4.31	Bendix	Ross	S 60	Faf	Al-Z	*6.00x20
Stutz M	Link	Del-R	Del-R	Borg	†*Detr 4	M M	Tim ½	4.5	H	Gem	S 62¼	Own	Bijur	32x7.00
Viking Eight	Whit	Del-R	Del-R	Borg	Mun 3	M M	Own ¾	4.63	Bendix	Sag	S 58	Tryon	Alem	6.00x30
Windsor 6-69	Chain	Aut-L	Aut-L	Borg	War-G 3	M M	Col ½	4.9	H	Ross	S 55	Own	Alem	29x5.25
Windsor 6-72	Link	Del-R	*Del-R	Borg	War-G 3	M M	Col ½	4.9	H	Ross	S 54	Own	Alem	29x5.50
Windsor 6-77	Link	Del-R	*Del-R	Borg	*War-G 3	M M	Col ½	4.9	H	Ross	S 54	Own	Alem	29x5.50
Windsor 8-85	Link	Del-R	*Del-R	Borg	War-G 3	M M	Col ½	4.63	H	Ross	S 54	Own	Alem	31x6.00
Windsor 8-92	Link	Del-R	Del-R	Borg	*War-G 4	M M	Col ½	3.9	H	Ross	S 54	Own	Alem	31x6.50
Whippet Four		Aut-L	*Aut-L	Borg	Own 3	M M	Own	4.55	Bendix	Own	S 49½	Tryon	Alem	4.75x28
Willys Six	Var	Aut-L	†*Aut-L	Borg	Own 3	M M	Own ½	4.09	Bendix	Own	S 45	Tryon	Alem	5.00x29
Willys-Knight 66-B	Var	N E	*N E	Rock	Own 3	M M	Own ½	4.6	Bendix	Ross	S 57½	Own	Bijur	6.00x31
Willys-Knight 70-B	Link	Aut-L	*Aut-L	Rock	Own 3	M M	Own ½	4.89	Bendix	Own	S 53	Tryon	Alem	5.50x29

In the Bus Field

Merchantville, N. J., Jan. 20.—Permit to operate ten buses as an interstate transportation line between Maple Shade and Philadelphia has been granted by Borough Council to J. P. Mahan, operator of the Blue Bus Line.

Vandalia, Ill., Jan. 20.—The Illinois Commerce Commission has approved the sale of the Red Line Motor Bus Company to the Blue Goose Motor Coach Company for $12,162. This includes the franchise to operate between Vandalia and East St. Louis and between Edwardsville and Glen Carbon.

Quincy, Ill., Jan. 20.—Daniel and Ernest Wendt have sold the Gem City Motor Bus Company to the Eagle Motor Coach Company of Peoria, of which John Dixon is president, Ross Dixon vice-president and Frank Dixon secretary-treasurer. The retiring company operated buses between Quincy, Mount Sterling and Rushville. The Wendts plan to operate long distance tours, to be known as the Red Bird.

GIANT FOKKER PLANE WILL BE COMMISSIONED SUNDAY

New York, Jan. 20.—The world's largest land plane, the Fokker F-32, will go into commission Sunday, Capt. E. V. Rickenbacker, ace of the A. E. F. and now vice-president of the Fokker Corporation, announces that all preliminary tests had been highly satisfactory and that Western Air Express, which has ordered five of the giant planes, would take delivery this week.

13,390 CARS FOR JANUARY OAKLAND PLANT SCHEDULES

Pontiac, Mich., Jan. 20. — The Oakland Motor Car Company's total production schedule for January is 13,390 cars, according to an announcement by Gordon Lefebre, vice-president in charge of operations. The schedule calls for 9,879 Pontiacs and 3,511 Oaklands. The February production schedule is expected to call for a minimum of 15,000.

FUELS TO FEATURE S. A. E. SESSIONS

(Continued from Page 1)

addressed this meeting on the "Economics of Production."

Technical sessions will get under way at 9.30 tomorrow morning with a meeting of the co-operative research session. This session will be presided over by W. S. James and will feature the following papers: "The Properties of Gasoline With Reference to Vapor Lock," O. C. Bridgeman, Bureau of Standards; "Influence of Atmospheric Conditions on Knock Testing," D. B. Brooks, Bureau of Standards, and "Effect of Design on Engine Acceleration," D. B. Brooks and C. S. Bruce, Bureau of Standards.

The detonation session in the afternoon under the chairmanship of H. L. Horning will hear two papers covering a wide research in this field. The first paper has been compiled by John M. Campbell, Wheeler G. Lovell and T. A. Boyd of General Motors research laboratories, and covers the "Detonation Characteristics of Some of the Fuels Suggested as Standards of Anti-Knock Quality."

The authors of this paper point out the need of some reproducible reference fuel or scale of fuels to be used in measuring detonation characteristics, so as to provide a common basis of comparison between different laboratories. To this end they present data in terms of compression ratio for incipient knock over the entire range of composition from zero to 100 per cent. concentration, as determined in admixture of normal heptane.

Normal heptane, they declare, seems to be the only one of the several fuels included in this survey that had a sufficient degree of tendency to knock to make it suitable to form the lower limit of a scale of anti-knock quality consisting of two pure fuels mixed in various proportions, one of low and one of high anti-knock quality. Of the fuels from which a selection might be made for the upper limit of such a scale there are cyclohexane, iso-octane, benzene, toluene and alcohol, each having certain advantages and disadvantages, some of which are discussed.

The second paper to be presented at this session has been prepared by C. H. Barton, Asiatic Petroleum Company; C. H. Sprake, Anglo-American Oil Company, and R. Stanfield, Anglo-Persian Oil Company. It covers a "Comparison of Anti-Knock Rating Determined in Different Laboratories," and is based on tests conducted about a year ago in the laboratories of three British oil companies to ascertain the anti-knock properties of fuels, with the object of obtaining uniformity in expression of anti-knock values, which are described and the results compared.

Nine gasolines of qualities normally obtainable in the British market were used in the tests and the results are expressed in terms of percentage by volume of equivalent blends of heptane and pure benzene. Each laboratory followed its own standard method of testing and, to insure uniformity, the supplies of heptane and benzene were bulked and redivided before use.

The tests show that, within the very narrow limits investigated, very concordant knock ratings for different fuels can be obtained with engines of widely different design and working conditions if temperature and speed are carefully controlled and settings are adjusted for maximum-knock mixture-strength.

SHIPMENT OF TIRES IN NOVEMBER DROPS

New York, Jan. 20.—Shipments of all types of pneumatic casings by tire manufacturers in the United States in November totaled 3,557,759, against 4,959,676 casings in October and 4,998,254 in November, 1928.

Production of pneumatic casings in November totaled 3,603,436 units, against 4,918,912 units in October and 6,074,792 units in November, 1928.

Inventories of pneumatic casings on November 30 were approximately the same as at the end of the preceding month and the corresponding month of the previous year.

CAR, TRUCK AND BUS FLEET OWNER LIST
For Any Section of the Country
FLEET OWNER LIST CO.
1817 Broadway, N. Y. C.

Production -- Engineering -- Factory

Characteristics of Detonation In Anti-Knock Standard Fuels Described at S. A. E. Session

The following paper on "Detonation Characteristics of Some of the Fuels Suggested as Standards of Anti-Knock Quality" will be presented today at the detonation session of the Society of Automotive Engineers annual meeting at the Book - Cadillac Hotel, Detroit, by John M. Campbell, research chemist; Wheeler G. Lovell, assistant head of fuel section, and T. A. Boyd, head of fuel section, all of Research Laboratories, General Motors Corporation, Detroit.

THE three principal requirements of any system of measuring the anti-knock quality of a gasoline are (a) a standard engine, (b) a standard procedure and (c) a standard fuel. Items (a) and (b) are necessary because the tendency of a given fuel to knock may depend in a large measure upon the design of the engine in which the fuel is burned and the conditions under which the engine is operated. Even the relative tendency of one fuel to knock with respect to that of another may depend to some extent upon the factors of design and the conditions of operation.

Whatever method of knock rating is employed, a standard fuel is required both to provide a common basis of comparison between the observations of different laboratories and to furnish a definite means of keeping the knock ratings of any individual laboratory on a uniform basis. If, for instance, anti-knock quality is measured in terms of compression ratio for a definite degree of knock in a certain engine and under given conditions, a standard fuel offers the only definite or altogether reproducible basis for checking the mechanical condition of the engine from time to time. Likewise, if anti-knock quality is measured in terms of operating variables, such as throttle opening or spark advance for a definite degree of knock in a certain engine under given conditions, a standard fuel offers the only means of definitely standardizing the mechanical condition of the engine.

Another use for a standard fuel is found in connection with those methods of measurement which express anti-knock quality directly in terms of the chemical composition of some reference fuel. Thus the anti-knock quality of a fuel is sometimes expressed in terms of the amount of some knock suppressor or knock reducer that must be added to a reference gasoline to produce a fuel having the same tendency to knock under definite conditions as has the fuel under examination. But the only definite and positively reproducible means of checking the anti-knock quality of the reference fuel, after long periods of storage and as new stocks are added to replace those exhausted, is by means of some standard fuel of definite chemical composition which can be exactly duplicated at any time.

Still another use for a standard fuel is found in those methods of knock rating in which the anti-knock quality of a fuel is expressed in terms of changes in the composition of the standard fuel itself. Such a standard fuel is really of variable composition and may consist of a mixture of two fuels of widely different anti-knock qualities that can be mixed in the right proportions to match the anti-knock quality of any fuel which it may be desired to rate. The particular advantage of this method of expressing anti-knock quality is that, when the two components of the standard fuel are pure substances it is possible to establish anti-knock specifications which are reproducible to an exact degree by any one and at any time or place, provided the equipment and operating conditions are maintained reasonably uniform. This is true irrespective of whether measurements of detonation are made by car or by means of some form of instrumentation.

Requirements for Standard Fuels

It is apparent that, as already said, any fuels which are used as standards of anti-knock quality should be of definite chemical composition so that they can be reproduced at any time. One way of meeting this requirement definitely is to make the standard fuels out of pure substances that can be mixed in known quantities. A gasoline is not a suitable standard because it cannot be reproduced in anti-knock qality to an accuracy greater than the experimental error in matching fuels. This process involves the possibility of a cumulative error to such an extent that, after several successive restandardizations, the reference gasoline might conceivably have a knock rating appreciably different from the original.

Further, gasolines, and especially cracked gasolines of high anti-knock quality, are not suitable for standard fuels because of their tendency to change their knock rating in storage. It is desirable, however, that the standard fuel be as nearly like gasoline as possible in its physical and chemical properties. It should be composed of defenite materials that are available in sufficient quantities to meet the widespread demand for a standard fuel. Finally, to serve as a standard of variable composition, it should be composed of substances which, when combined in various relative percentages, can be made to duplicate the anti-knock quality of the entire range of gasolines that have to be rated.

Although a number of chemical compounds exist which meet some or all of these requirements for a standard of anti-knock quality, no comprehensive data on the relationships that they bear to one another have been published; consequently, it has been thought worth while to present some quantitative data on the detonation characteristics of several of the more common individual compounds that have been considered, and to make these data cover the entire range of composition from zero to 100 per cent. concentration of each. Such data are presented in this paper, and the principal compounds are discussed from the viewpoint of their suitability for preparing a standard fuel mixture of variable composition that can be made to match the anti-knock quality of any commercial fuel.

Experimental Equipment Described

The detonation characteristics of these fuels were determined in the one-cylinder variable compression engine shown in Figure 1. This engine was designed and built in the research laboratories of our company, following a general design made by Henry M. Crane. The engine is of the valve-in-head type with a 3¼-inch bore and a 4½-inch stroke. The compression ratio can be changed, even while the engine is running, by raising or lowering the entire cylinder-head and valve mechanism.

This is accomplished by turning with a crank two collars which are threaded to the skirt of the cylinder. The collars are placed on either side of a supporting shoulder so that the cylinder head can be clamped rigidly in place by turning down the upper collar separately against the shoulder, which is a part of the crank case. This variable compression feature of the engine is especially desirable for knock testing because it provides a convenient means of adjusting the engine to conditions favorable for testing any particular fuel whether its anti-knock quality be high or low. The valves are actuated by rocker arms through a vertical cam shaft which is splined to allow for the up-and-down movement of the cylinder head when the compression ratio is varied. Figure 2 shows the general details of this construction.

The engine is connected to an electric dynamometer for absorbing the load and controlling the speed. An evaporative cooling system that provides ample room for water circulation around the entire cylinder head automatically maintains the jacket water temperature at about 212 degrees Fahrenheit. The spark timing is observed by the flash in a small neon tube, attached to the flywheel, as it passes a stationary protractor which is insulated from the ground and connected to the high-tension wire leading to the spark plug.

The carburetor was especially built for knock testing. It has a fixed jet and two float bowls independently adjustable for height, so that the mixture ratio for each of the two fuels can be controlled as desired by adjusting the level of each float bowl with respect to the common fuel jet. A three-way cock inserted in the fuel line between the float bowls and the jet makes it possible to change quickly from one fuel to another without interrupting the operation of the engine. The venturi tube of the carburetor is in a horizontal position and discharges the fuel mixture directly into the inlet port of the engine. No heat is supplied to the mixture before it enters the cylinder. The carburetor has no throttle, hence the engine is always operated with the same inlet opening. A muffler was attached to the intake of the carburetor during these experiments to reduce to the minimum the sucking noise during the intake stroke.

Method of Making Knock Measurements

Comparisons of the detonation characteristics of the fuels and fuel mixtures used were made on the basis of the compression ratio for borderline detonation or incipient knock. This critical compression ratio is defined as that at which detonation becomes just audible under the following specified conditions of operation: Full load; engine speed, 600 r. p. m.; jacket water boiling, 212 degrees Fahrenheit; mixture ratio for maximum power and spark advance for maximum power.

This procedure is similar to that employed by H. R. Ricardo several years ago[1], the chief differences being that he chose 1,500 r. p. m. as his working speed. We have used a low speed in this work for the following reasons:—

(1) An engine runs more quietly at lower speeds and the accuracy of determinations made by ear is correspondingly greater.

(2) From the practical viewpoint, knocking in automobiles is most objectionable at low speeds and full load.

(3) At low speeds an engine requires less fuel, of which sometimes only a limited quantity is available.

(4) At the lower speeds the temperature within the combustion chamber, especially of the spark plug and exhaust valve, is lower, therefore more uniform operation of the engine can be expected.

(5) The tendency of any fuel to knock is greater at low speeds than at high speeds, hence it becomes possible to obtain knock measurements on some fuels which could not be made to knock at high speeds.

Experiments were made which indicate that the spark advance for maximum power at compression ratios close to the detonation point is not appreciably affected by the chemical composition of the fuel whether the latter be a hydrocarbon or an alcohol. For this reason the spark timing was adjusted for maximum power at each compression ratio in conformity with a previously determined curve, such as that shown in Figure 3. This figure shows also the gauge compression pressure and the brake horse power of the engine at various compression ratios extending from 3:1 up to 15:1 under the standard operating conditions.

The mixture ratio was adjusted in each case for maximum power as indicated on the beam of the dynamometer scale. This adjustment was much easier to make experimentally than that for maximum knock, although the two were identical as nearly as could be determined by ear.

The compression ratio was determined by measuring with a micrometer the distance between two fixed anvils, one fastened to the cylinder head and the other mounted on the crank case. The compression ratio corresponding to this distance was then obtained from a calibration curve previously prepared.

Fuels Available

The fuels on which detonation data are presented are listed, together with their structural formulas, densities, boiling points and sources, in Table 1. Some of these fuels have been proposed definitely as standard fuels. Dr. Graham Edgar proposed for this purpose the use of mixtures of normal heptane, a paraffin hydrocarbon of low anti-knock quality, and iso-octane (2, 2, 4-trimethyl pentane), a hydrocarbon of high anti-knock quality.[2]

R. Stansfield and F. B. Thole have suggested a modification of Edgar's plan, consisting in the substitution of benzene for iso-octane[3]. Toluene with heptane has also been used by H. R. Ricardo and O. Thornycroft to produce reference fuels with a range of anti-knock quality.[4]

Tabulation and Discussion of Data Obtained

The results of the investigation herein reported are tabulated in Table 2 and are shown graphically in Figure 4, in which is presented the relationship between the composition of each of the various mixtures, expressed as percentage by volume in normal heptane and the compression ratio for incipient knock. In Figure 4 the compression ratio for incipient knock is measured on the vertical axis and the percentage of admixture with normal heptane on the horizontal axis. The shaded band represents the range of compression ratios within which most of the automobile fuels that are being marketed today begin to knock. The upper limit of the band corresponds to the anti-knock fuels and the lower limit to the regular automobile gasolines. Most regular automobile gasolines come well above this lower limit. A gasoline which was approximately equivalent in knock rating to the average of the country, as found by the United States Bureau of Standards detonation survey of 1927 and reported upon by H. K. Cummings,[5] began to knock at a compression ratio of 3.6:1, or almost midway between the limits of the shaded band.

The data show that normal heptane begins to knock at a compression ratio of 2.75:1. When a substance of higher anti-knock quality is added to normal heptane in increasing proportions the compression ratio can be increased without knock along the curves of Figure 4, until the compression ratio is reached at which the fuel of higher anti-knock quality itself begins to knock.

It is important to note that the numerical values assigned to the compression ratios for incipient knock in this work apply only to this particular engine when it is operated under the conditions existing at the time the experiments were made. The characteristics of this engine are such that, in general, the limiting compression ratios reported here are about one ratio below those corresponding to conventional automotive engine experience.

The compression ratio for incipient knock could be determined, at the time the experiments were made, within 0.05 of a compression ratio. By this it is meant that detonation would be inaudible if the compression were lowered 0.05 of a ratio below that determined for incipient knock. This procedure constituted the experimental technique employed for establishing the compression ratio for incipient knock.

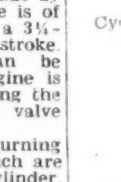
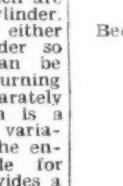
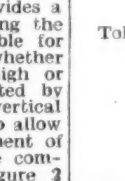
At compression rations above 10:1 the manifestation of "roughness" made more difficult the distinct detection of the characteristic sound of detonation. This roughness, however, should not be confused with pre-ignition, which is an altogether different phenomenon. Under the conditions of these tests pre-ignition was never observed at a compression ratio below that at which knocking began. The effect of normal variations of atmospheric conditions upon the determination was negligible, so far as was observed during the period of these tests.

Some Factors Influencing the Selection of Reference Fuels

The range of anti-knock quality of the fuels be rated is an important factor to be considered in the

(Continued on Page 9)

TABLE I—FUELS ON WHICH DATA ARE PRESENTED

Fuel	Structural Formula	Density at 20 Deg. Cent. (68 Deg. Fahr.)	Boiling-Point, Uncorrected	
			Deg. Cent.	Deg. Fahr.
Normal Pentane	$CH_3—CH_2—CH_2—CH_2—CH_3$	0.631	34.7— 41.0	94.5—105.8
Normal Heptane	$CH_3—CH_2—CH_2—CH_2—CH_2—CH_2—CH_3$	0.686	96.8— 99.4	206.6—211.0
Iso-Octane	$CH_3—C(CH_3)(CH_3)—CH_2—CH(CH_3)—CH_3$	0.691	97.6— 99.8	208.1—212.0
Cyclohexane		0.779	79.5— 81.0	175.5—178.0
Benzene		0.878	79.0— 79.0	174.5—174.5
Toluene		0.866	108.0—109.0	226.8—228.6
Ethyl Alcohol	$CH_3—CH_2OH$	0.789	78.1— 78.1	173.0—173.0

Detonation in Standard Anti-Knock Fuels Described

(Continued from Page 8)

selection of the fuels which are to be the most suitable for use as standards of anti-knock quality. Some gasolines are known which begin to knock at compression ratios as low as 3:1 in the engine used for these determinations; hence normal heptane, which has a limiting compression ratio of 2.75:1, under the conditions of these tests, is the only one of the hydrocarbons included in this survey the limiting compression ratio of which is low enough to form the base line of the scale.

Selection of the most suitable substance for use to form the upper limit of the scale of anti-knock quality is not so easy to make. Normal pentane is hardly suitable because its anti-knock quality or limiting compression ratio is below that of many of the gasolines currently sold. The extremely high volatility of normal pentane is also undesirable. Cyclohexane might be an excellent material to form the upper standard of anti-knock quality if the range within which knock ratings are to be made were to be confined to that covered by present-day automobile fuels.

Figure 4 shows that a convenient straight-line relationship exists between the compression ratio for incipient knock and the composition of cyclohexane and heptane mixtures. This seems to be desirable from the viewpoint of a standard fuel of variable composition, because it would provide a uniform change in standard fuel composition over all parts of the scale. Another feature of mixtures of cyclohexane and heptane that seems desirable is that an inaccuracy of 0.5 per cent. in measuring out the respective volumes of cyclohexane and of heptane would not introduce a large error in the knock rating of the mixture. This comes about because of the narrow range in anti-knock quality represented by the entire scale, and it would make it unnecessary to use extremely accurate measuring vessels in preparing

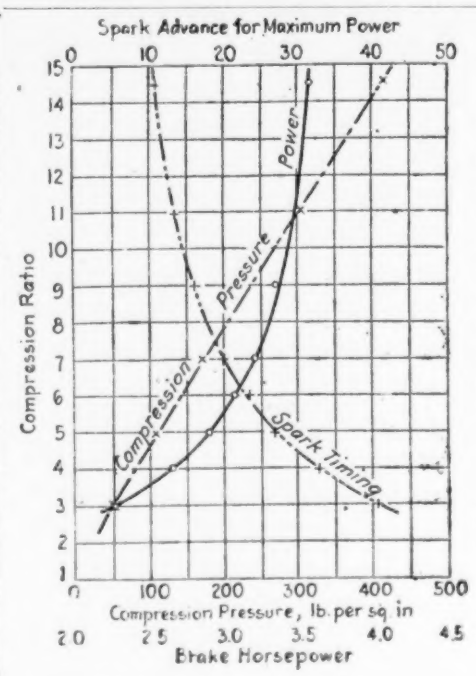


FIGURE 3—Showing brake horse power output, spark timing for maximum power and compression pressure plotted against compression ratio

These curves apply to this engine only when it is operated according to the procedure outlined

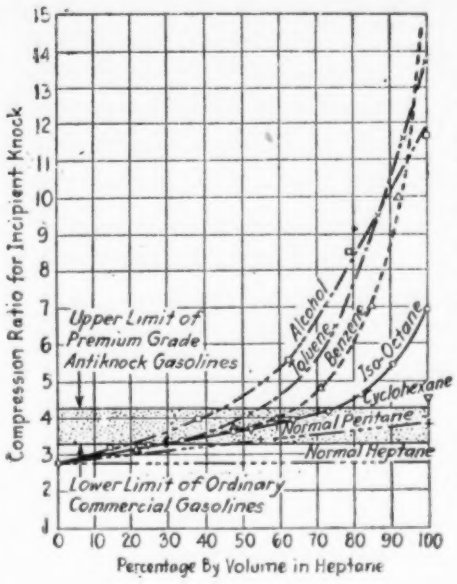


FIGURE 4 — Graphical representation of data in Table 2

Showing relative detonation characteristics of several fuels in admixture with normal heptane at concentrations from zero to 100 per cent. by volume. The shaded band represents the range of compression ratios within which most of the gasolines that are being marketed today begin to knock

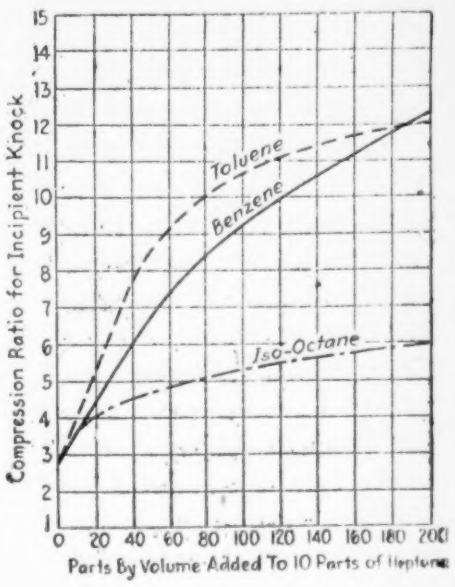


FIGURE 5—Composition of fuel mixtures based upon parts by volume added to 10 parts of heptane plotted against compression ratio for incipient knock

On this basis the composition of benzene-heptane mixtures have nearly a straight-line relationship to the compression ratio

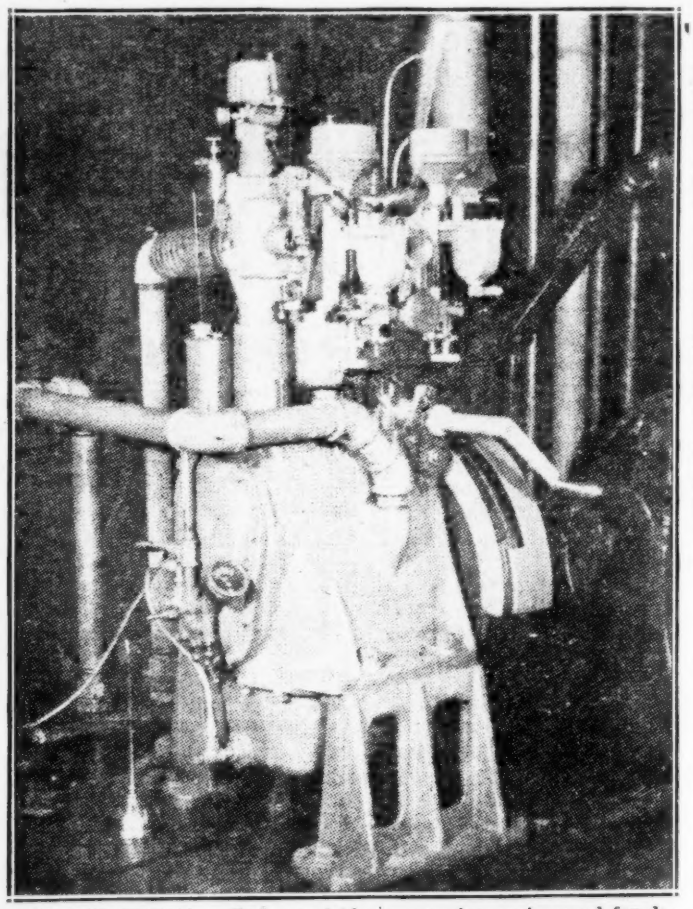


FIGURE 1—Single cylinder variable-compression engine used for determining the relative detonation characteristics of fuels

mixtures of the two standard fuels, as is the case with some of the materials discussed later; but the adoption of cyclohexane as a standard would place an upper limit on the scale of anti-knock quality that would be only slightly higher than that of some of the automobile fuels distributed today.

Iso-octane is one of the first compounds proposed for use as a standard fuel in mixtures with normal heptane, and it has been used to some extent. One of the points mentioned in favor of mixtures of iso-octane and normal heptane as standards of anti-knock quality is that the common physical properties of these two hydrocarbons are almost identical, and thus the physical characteristics of the mixtures remain practically unchanged over the entire range of composition.

One possible disadvantage of iso-octane is that some fuels might be found that have a higher anti-knock quality than iso-octane itself, which has a limiting compression ratio of 6.9:1 under the conditions of this survey. However, it may be that for a time, as far as automobile practice is concerned, such fuels may be used for blending purposes only. In such cases the anti-knock quality of the fuel, in admixture with the fuel with which it is to be blended, should be determined. The reason for this is that the knock rating of a pure substance cannot be taken as a direct indication of its effectiveness for improving anti-knock quality in a blend. This is another point which is evident from the data presented in Figure 4; for example, the anti-knock quality of pure benzene is superior to that of iso-octane, although, in blends with normal heptane up to 50 per cent., iso-octane is just as effective by volume as benzene for increasing the anti-knock quality of the mixture.

Benzene and toluene are both quite high in respect to anti-knock quality when used alone, the limiting compression-ratio for toluene under the conditions of these tests being 13.6:1, and that for benzene being more than 15.05[1]. Both benzene and toluene have been used as reference fuels in making knock ratings. One of the apparent disadvantages of these substances for use in mixtures with normal heptane is the relatively large variation in anti-knock quality that is brought about by a small change in the composition of the mixture on certain parts of the scale. Thus, at the point corresponding to the upper limit of the premium-grade gasolines referred to in Figure 4, a variation of 0.5 per cent. of benzene in heptane is equivalent to about 0.04 of a compression ratio or to about 0.2 cc. of tetraethyl lead per gal. This variation in concentration of tetraethyl lead is greater than the tolerance desirable in some knock ratings. Accordingly, great care is necessary in measuring out the components of these mixtures when they are to be used as standard fuels. It is also essential that the benzene used for this purpose be of a high degree of purity.

Another apparent disadvantage if mixtures of benzine or of toluene with normal heptane is the large variation in anti-knock effect resulting from a given change in composition on different parts of the scale. For example, referring to Figure 4, increasing the concentration of benzene in heptane from 30 to 40 per cent. permits an increase of 0.2 of a compression ratio; whereas an increase in concentration of benzine from 80 to 90 per cent. allows an increase of 2.8 compression ratios. So, over the latter range, a given change in concentration of benzene produces nearly 15 times as large an effect on anti-knock quality as over the former range. This objectionable feature is overcome somewhat by plotting the scale of knock rating on the basis of the amount of benzene added to a constant volume of normal heptane, as shown in Figure 5.

In Figure 5, compression ratios for incipient knock are plotted on the vertical axis as in Figure 4, but along the horizontal axis the concentrations of benzene, of toluene, and of iso-octane in heptane are plotted on the basis of number of parts by volume of these substances added to 10 parts by volume of normal heptane. This means that 10 on the horizontal scale of Figure 5 corresponds to the 50-per cent. point

(Continued on Page 11)

Table 2—Results of the investigation (See Figure 4 for graphical analysis):—

Composition of Fuel, Percentage by Volume in Heptane		Compression Ratio for Incipient Knock
100.0	Normal Heptane	2.75
0.0	Normal Pentane	2.75
53.9		3.40
100.0		3.80
0.0	Iso-Octane	2.75
33.0		3.35
47.7		3.60
63.0		3.90
73.0		4.20
82.0		4.65
91.5		5.40
100.0		6.90
0.0	Benzene	2.75
20.9		3.15
47.7		3.65
59.0		3.95
71.0		4.80
85.0		7.05
92.3		10.00
100.0		above 15.00
0.0	Toluene	2.75
23.8		3.23
52.5		4.10
74.6		6.50
87.2		9.50
93.5		11.60
100.0		13.60
0.0	Cyclohexane	2.75
24.5		3.25
52.8		3.70
100.0		4.50
0.0	Absolute Ethyl Alcohol	2.75
14.6		3.20
37.7		3.97
61.6		5.60
78.8		8.50
100.0		11.60

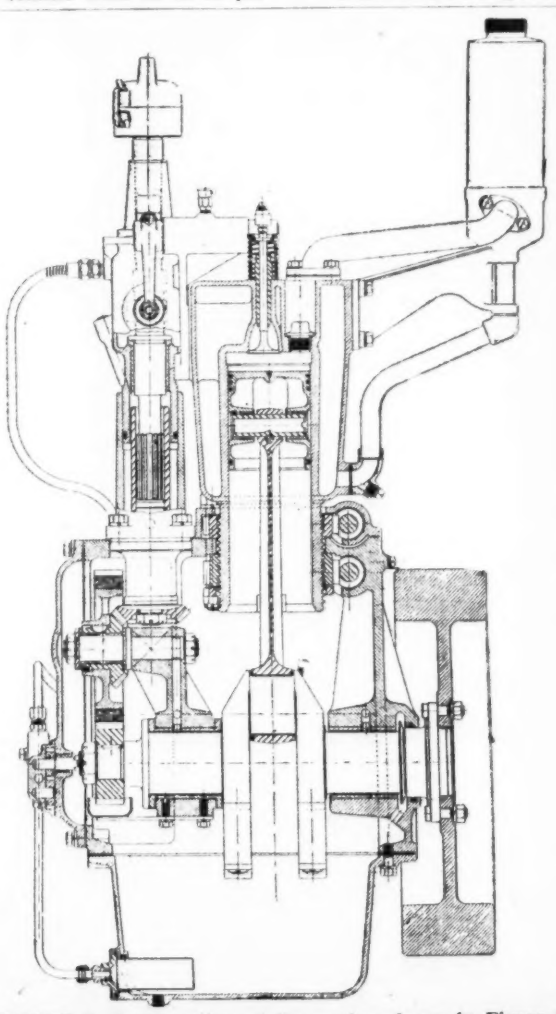


FIGURE 2—Cross-section of the engine shown in Figure 1

[1]See report of Empire Motor Fuels Committee (1923-1924), Institution of Automobile Engineers (London), vol. 18, part 1, page 77.
[2]See S. A. E. Journal, February, 1927, page 245.
[3]See Journal of Industrial and Engineering Chemistry; Analytical, Vol. 1, page 98 (1929).
[4]See paper No. N6, "Transactions of the Fuel Conference, World Power Conference (London), 1928, Vol. 3, page 662.
[5]See S. A. E. Journal, April, 1928, page 449.

S. A. E. Hears Comparison of Anti-Knock Ratings

A paper on 'Comparison of Anti-knock Ratings Determined in Different Laboratories" will be presented today at the Detonation Session of the Society of Automotive Engineers' annual meeting at the Book-Cadillac Hotel by C. H. Barton, Asiatic Petroleum Company; C. H. Sprake, Anglo-American Oil Company, and R. Stansfield, Anglo-Persian Oil Company, all of London, England. Their papers are given in full below.

TOWARD the end of 1928 a co-operative committee was formed from the technical staffs of the Anglo-American Oil Company, the Anglo-Persian Oil Company and the Asiatic Petroleum Company to discuss and compare the methods used by the three companies for testing the anti-knock properties of fuels, with the object of obtaining uniformity in expression of anti-knock value. The tests described in the present paper were carried out about a year ago.

As a result of a preliminary discussion, it was decided to put in hand tests in the laboratories of the three companies on nine gasolines of qualities normally obtainable in the British market and to express results in terms of the equivalent blends of nheptane and pure benzine. Heptane was chosen as being the only readily available pure hydrocarbon of low anti-knock value, while benzine is the obvious choice for a pure hydrocarbon of high anti-knock rating. Each laboratory was left free to use its own standard method of testing, and, to insure uniformity of standards, the supplies of heptane and benzine available were bulked and redivided before use.

The final report on the test results refers to three engines: a Delco plant used by the Anglo-American Oil Company, an Armstrong-Whitworth plant used by the Anglo-Persian Oil Company, and a Ricardo E-35 unit used by the Asiatic Petroleum Company.

Details of all these sets have been published from time to time in the technical press.

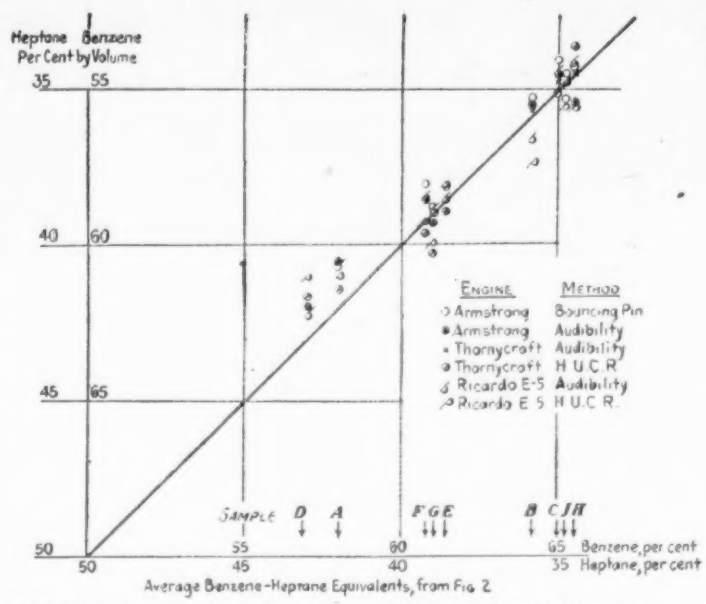


FIGURE 1—Results of anti-knock tests on three engines in laboratory of Anglo-Persian Oil Company

Results of the individual tests are plotted against mean values obtained from the first series of tests. The maximum deviation was 2.2 per cent. benzene, and the average deviation for fifty-four tests was 0.24 per cent. from the average values obtained by three laboratories

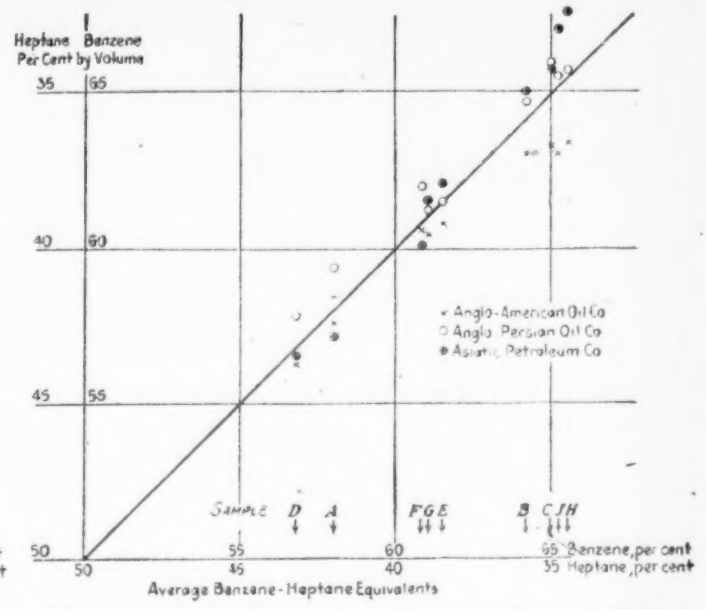

Heptane Benzene
Per Cent by Volume
35 65
40 60
45 55
50
× Anglo-American Oil Co
○ Anglo-Persian Oil Co
● Asiatic Petroleum Co
Sample D A F G E B C J H
50 55 60 65 Benzene, per cent
50 45 40 35 Heptane, per cent
Average Benzene-Heptane Equivalents

FIGURE 2—Relation between individual test-results obtained in three laboratories and average anti-knock values

Anti-knock values assigned to various benzene-heptane blends by each laboratory, after completion of tests, were averaged and plotted as shown. The extreme deviation from the mean ranges from +2.1 per cent. to —2.2 per cent. benzene

Anglo-American Oil Co.'s Tests

The engine is of 2½-inch bore by 5-inch stroke, giving a swept volume of 402 cc. (24.53 cubic inches), and the compression ratio is 7.5 to 1. The cooling is by water and works on the evaporative system, with control of the temperature of condensate return to the base of the cylinder, which is maintained at 100 degrees Fahrenheit.

The ignition, which is by 32-volt Delco coil, is set for maximum power at a speed of 600 r. p. m. and is run from a 32-volt battery which is kept charged by the engine generator and is also used for starting and for operating the electrolytic cell, or voltameter.

Detonation is measured by the Midgley bouncing pin and electrolytic cell, the pin being set just to give no gas generation at 600 r. p. m. on a non-pinking fuel using the same throttle setting as for the fuel under test.

All tests are carried out using a mixture strength to produce maximum knock, and the throttle is set to obtain a gas generation of approximately 0.5 cc. per minute with the fuel under test.

A special feature of the engine is the carbureter system, which consists of two float-chambers working on vertical slides and fitted with gauge glasses showing the level of the fuel against a fixed scale, the float chamber being fed from inverted overhead bottles on the chicken-fountain principle. Flexible pipes connect the float chamber to the jet-supply chambers, and instantaneous change-over from the reference fuel to the fuel under test is effected by a three-way cock fitted close to the jet. Working within its limits, that is, from the weakest mixture to the level at which the jet overflows, this system is very sensitive to changes in anti-knock values, a difference of approximately 0.1 cc. in gas generation for 1-min. runs being obtained for the addition of 1 per cent. benzine to a given fuel. The electrolytic cell is graduated in hundredths of a cubic centimeter, and 0.1 cc. is the capacity of approximately ⅜ inch of the graduated tube. This system obviates the possible instability of variable jets and is readily reproducile.

The engine is direct-coupled to a 1,250-watt dynamo, the output from which is absorbed by a fixed resistance. The engine speed can be closely controlled by a voltage regulator, and all the tests described later were made at a speed of 600 r. p. m.

In making tests, alternate runs of 1 min. are taken on the reference fuel and the fuel under test, and the correct mixture of reference fuels to equal the fuel under test is found by trial and error.

In the present series of tests, a number of mixtures of benzene and heptane were matched against a fuel of low anti-knock value plus ethyl fluid, and the fuels under test were first matched against this low-grade fuel plus ethyl fluid so as to minimize the quantity of heptane required. When the approximate benzene-heptane values of the fuels had been found in this way, check tests were carried out comparing the various fuels directly against the benzene-heptane value thus arrived at, with slight adjustments in the proportions of benzene to heptane where necessary.

Anglo-Persian Oil Co.'s Tests

The Armstrong-Whitworth plant includes a 2¾-in. bore by 3½-in. stroke side-valve engine having a cylinder-head fitted with a sliding plug which can be moved to vary the compression ratio between the limits of 4-1 and 8-1. The lower end of this plug is arranged to take the diaphragm of a Midgley bouncing-pin indicator. The water system is divided to give separate cooling for the head and the jacket, and an electric heater is fitted for the inlet air. The fuel is fed through a single adjustable jet from any of the three flowmeters, and the flow is arranged to be direct from the meters without float chamber or weir. Tests are made at full throttle, the compression ratio being adjusted by means of the variable-compression plug to give continuous knocking of a degree sufficient to operate the bouncing-pin indicator with the gasoline under test.

The following are the normal working conditions of the test:—

Engine speed, r.p.m.	750
Temperature of water-outlet from jacket and cylinder head, deg. fahr.	120
Air-inlet temperature, deg. fahr.	120
Ignition advance, deg.	12

No alteration is made to ignition advance with change of compression ratio.

The sample to be tested is run from one of the flowmeters and the compression ratio is adjusted until the knocking is of standard intensity. The ratio necessary for this indicates approximately the value of the gasoline in terms of a blend of benzene and heptane. Two standard blends are then made, one slightly lower in anti-knock value than the sample and the other slightly higher and differing by 2 per cent of benzene in heptane. Voltameter gas-collections over successive 1 minute intervals are then taken from each of the standard blends and the sample, the air-fuel

(Continued on Page 11)

TABLE 2—ANALYTICAL DATA ON FUELS TESTED

	A	B	C	D	E	F	G	H	J
Specific Gravity, at 60 deg. fahr.	0.139	0.727	0.728	0.735	0.738	0.743	0.727	0.732	0.724
Initial Boiling Point, deg. cent.	37	28	35	38	35	37	39	41	40
Volume Distilled to, deg. cent.									
50, per cent.	2	3.5	5	3	3.5	3.5	1	f.d.	f.d.
75, per cent.	16	25	20	17.5	16	13.5	21	14	16
100, per cent.	46	43	39	36.5	34.5	27.5	66.5	56	63
125, per cent.	71	63	64	59	56	48.5	91	86	91
150, per cent.	89	80	83	79	77.5	70	..	96	97
175, per cent.	96.5	92	93	93	91.5	89.5	..	..	..
200, per cent.	..	96.5	..	..	..	..	..	..	..
End-Point, deg. cent.	180.5	202	187	195	199	197	149	157	152
Residue, per cent.	98.0	97.5	96.0	98.0	97.5	97.0	98.0	97.5	97.5
Total Distilled, per cent.	1.0	1.0	1.2	1.0	1.1	1.0	1.1	1.0	1.0
Loss, per cent.	1.0	1.5	2.8	1.0	1.4	2.0	0.9	1.5	1.1
Aromatics, per cent. by volume	18.1	6.9	..	10.6	9.1	..	16.6	10.8	7.0
Critical Solution Temperature									
Before Acid, deg. fahr.	46.20	52.70	‡	52.30	52.10	‡	46.20	47.00	50.40
After Acid, deg. fahr.	64.15	59.65	‡	62.85	61.16	‡	62.95	57.80	57.55

‡Contains cracked fuel.

***For E-35 engine see Report of Empire Motor Fuels Committee, issued by the Institute of Automobile Engineers (London), 1924, p. 63, and The Automobile Engineer, February to August, 1921. For Armstrong engine see Industrial and Engineering Chemistry, annual edition, April 15, 1929. For Delco engine see National Petroleum News, October 23, 1929, p. 57.**

Cumulative New Commercial Car Registration Table, December, 1929

Returns for today: Florida, Minnesota, Missouri and Rhode Island.

Some of this data has been published previously, but it is given here complete for the convenience of our subscribers.

States	Autocar	Brockway-Indiana	Chevrolet	Diamond-T	Dodge	Dover	Fargo	Federal	Ford	G. M. C.	International	Mack	Pierce-Arrow	Relay	Reo	Republic	Rugby	Sterling	Stewart	Studebaker	Whippet	White	Willys-Knight	Miscellaneous	Totals	States
Arkansas			33		1				32		1				1						1				69	Arkansas
Delaware	2	2	17		3				37	6					2							2		1	72	Delaware
Florida		6	120		10				228	1	9	1			10					1	4	1			391	Florida
Illinois	4	5	150	33	29	1	4	2	281	26	59	11	1		12			4	3		10	5		48	688	Illinois
Minnesota		3	105		13		3	1	250	5	38	2			4		1			1	5	3		9	443	Minnesota
Missouri	1	3	155	3	39	1	4	1	268	14	23	2			9		1	3		2	9	9		4	551	Missouri
Montana			5		1				7		6										1				20	Mont.
New Jersey		3	44		16		2	14	92	8	1	6			2			3			3	7		11	212	New Jer.
N. Dakota			16						20	3	2										1				42	N. Dakota
Rh. Island	1		17	1	17		2		48	4	7	7			5		1		1	1	2				114	R. Island
Utah			7		8				27	1	2				1		1				1				48	Utah
W. Virginia		1	77		30	2		1	136	8	18			1	6	1	1		2	1	5	2		6	298	West Va.
Wisconsin			125	2	23	2	2	5	220	16	23	4			13		2	9	2	3	7	6	1	10	475	Wisconsin
Totals	8	23	871	39	190	6	17	24	1646	92	189	33	1	1	65	1	7	19	8	9	49	35	1	89	3423	Totals

Figures in this table are from R. L. Polk & Co. of Detroit, with the exception of Illinois, which are supplied by the Robinson Advertising Service Springfield, Ill., and New Jersey, which are furnished by the New Jersey Motor List Co., New Car Division, Trenton, N. J. Readers desiring county, city or town lists, or lists of owners in any given section, may obtain these by addressing any of these three companies.

Commercial Car Registrations do not include buses.

London Oil Experts Discuss Anti-Knock Ratings

(Continued from Page 10)

ratio being adjusted in each case to give maximum knock.

The value of the sample in terms of the two standard hydrocarbons is then calculated from the ratio of the gas difference between the two standard blends and the difference between the lower of these and the sample; thus, if the gas difference between a 60 per cent. benzene and 40 per cent. heptane blend and a 62 per cent. benzene-38 per cent. heptane blend is 0.50 cc., and the difference between the 60-40 per cent. blend and the sample is 0.10cc., the sample is rated as 1-5 of 2 per cent. benzene better than the 60-40 per cent. blend; that is, as 60.4 per cent. benzene and 39.6 per cent. heptane. This procedure is repeated at least three times and the mean value taken as the result of the test. Values are not appreciably affected by small changes of speed, although this is maintained constant to within 5 r. p. m., more or less. The allowable temperature variation for water and inlet-air is 1 degree fahr., more or less.

In addition to bouncing-pin tests, the Anglo-Persian Oil Company made determinations on a 1-liter (61.022-cu. in.) capacity, overhead valve Thornycroft engine running at 1,200 r. p. m. and on a Ricardo E-5 sleeve-valve engine of 350-cc. (21.357-cu. in.) capacity running at 1,750 r. p. m. Both of these engines were of the variable compression type, and these further runs included audibility tests and tests for highest useful compression ratio. The results are plotted on Figure 1 against the mean values obtained from the first series of tests. The maximum deviation was 2.20 per cent. benzene, and the average deviation for 54 tests was 0.24 per cent. benzine from the average values obtained by the three laboratories.

Asiatic Petroleum Company's Tests

The procedure in carrying out the tests with the E-35 engine, which has a bore and stroke of 4½x8 in., is as follows:

After warming-up the engine thoroughly by running it on a standard fuel, the compression ratio is set to 4.5 to 1 and the throttle fully opened. The engine speed is then adjusted to 1,500 r. p. m., which is the speed at which this engine develops its maximum torque, and the fuel is changed over to the gasoline to be tested, after which the highest useful compression ratio is determined under the following engine conditions:—

Full throttle.

Speed, 1,500 r. p. m. (=2,000 ft. per min. piston speed).

Heat input to induction system, by means of electric heater in air intake, adjusted to 76.7 B.t.u. per min. (1,350 watts)

Water-jacket temperature, deg. cent. 55±1.

Mixture strength delivered by carbureter adjusted to give maximum power output.

Ignition advance adjusted to the optimum advance for the compression ratio at which the engine is running. (A calibration curve showing the optimum ignition-settings over the whole range of compression ratio has been previously determined, using a gasoline giving no detonation.)

With all the foregoing conditions carefully maintained, the compression ratio is gradually raised and for each small increment the ignition is re-set according to the optimum curve. This procedure is continued, the power output being recorded, together with remarks about intensity of audible detonation, at each increase in compression ratio until the detonation intensity reaches "frequent moderate." The power output is a maximum at this point; that is, any further increase in compression ratio produces heavier detonation and the power output no longer increases. The compression ratio reached at "frequent moderate" detonation is the observed highest useful compression-ratio.

Owing to the variations which occur from day to day in barometric and temperature condition, the observed H. U. C. R. must be corrected to a common standard. A check test is therefore run on a standard (straight-run) fuel of medium volatility; that is, distilling about 30 per cent. up to 100 deg. cent. (212 deg. fahr.) and having an end-point of about 200 deg. cent. (392 deg. fahr.) in the A.S.T.M. distillation. The difference between the observed value on the check test and the arbitrary H. U. C. R. value attached to the standard fuel is then added to the value of the sample under test to obtain the corrected H. U. C. R. of the sample.

The method used provides two observations at the "observed H. U. C. R." One is the audible indication which is readily appreciated by an experienced observer and the other is the marked discontinuity in the curve of engine torque, or power, and compression ratio. This discontinuity is very marked at the H. U. C. R. if the engine conditions as described are maintained. The error of the method is found to be 0.03 H. U. C. R. unit. This corresponds with the effect of about 0.6 per cent. benzene in a mixture of 60 per cent. benzene with 40 per cent. heptane by volume.

In the present tests the corrected H. U. C. R. of each fuel was determined by the method described. The equivalent blends of benzene and heptane were read off from the curve showing the previously ascertained relation between H. U. C. R. and percentages of benzene and heptane. Finally, each of the nine equivalent blends of benzene and heptane were made up and direct comparisons by further engine tests were made, each sample being tested consecutively to its equivalent benzene-heptane blend. The final value given to each sample was, therefore, checked and corrected by comparative tests made at very nearly the same compression ratio.

Discussion of Results

On completion of the tests the values assigned by each laboratory were averaged. Figure 2 shows the results plotted against the average for each gasoline. The extreme deviation from the mean was + 2.10 per cent. benzene in one case and — 2.20 per cent. in another case. The average and maximum deviations of the three laboratories are shown in the following table:—

Laboratory	Average Deviation from Mean in Per Cent. of Benzine Content	Maximum Deviation from Mean in Per Cent. of Benzine Content
Anglo-American	1.10 below	2.20 below
Asiatic Petroleum	0.50 above	2.10 above
Anglo-Persian	0.60 above	1.30 above

The agreement between individual results is generally less satisfactory for fuels of higher antiknock value than for those of lower antiknock value. This is shown by the table at the bottom of this page.

It is evident from these figures that a mean curve through the Anglo-Persian and the Asiatic Petroleum Company's results would tend to diverge upward at the higher points from the line shown in the diagram, while the curve through the Anglo-American Company's results would diverge downward at the high results. There is at present no obvious explanation for these differences between the results, on the highest anti-knock fuels, of the Armstrong and E-35 engines, on the one hand, and those of the Delco engine, on the other hand. It seems scarcely likely that the difference in throttling accounts for the disagreement, since, with the highest anti-knock fuels, the difference between the Delco and the other engines in this respect is less with these fuels than with the fuels of lower anti-knock value.

The tests are of interest as showing that, within the comparatively narrow limits represented (57 per cent. benzene in 43 per cent. heptane to 67 per cent. benzene in 33 per cent. heptane), very concordant knock ratings of different fuels can be obtained with engines of widely different design and working conditions, provided the settings in all cases are properly adjusted for maximum-knock mixture-strength and that a careful control of the engine conditions, that is, temperatures and speed, is maintained, to assure uniformity throughout the series of tests.

The engine results are shown in Table 1, and the distillation tests and other data of the gasolines are given in Table 2.

Laboratories	Average Difference for Four Fuels of Highest Anti-knock Value, Per Cent. of Benzine	Average Difference for All Fuels, Per Cent. of Benzine
Asiatic Petroleum and Anglo-American	3.10	1.60
Anglo-Persian and Anglo-American	2.25	1.70
Asiatic Petroleum and Anglo-Persian	0.85	—0.10

TABLE 1—Content of benzene in benzene-Heptane mixtures to match fuel under test, percentage by volume

Gasoline	Tests Made by Anglo-American Oil Co.	Asiatic Petroleum Co.	Anglo-Persian Oil Co.	Average
A	57.5	57.1	59.3	58.0
B	63.0	65.0	64.7	64.2
C	63.5	65.7	65.9	65.0
D	56.2	56.4	57.7	56.8
E	60.7	62.1	61.4	61.4
F	60.5	60.0	62.0	60.8
G	60.3	61.4	61.2	61.0
H	63.3	67.6	65.7	65.5
J	63.0	67.0	65.5	65.2

Detonation Characteristics In Anti-Knock Fuels

(Continued from Page 9)

in Figure 4, and that 30 in Figure 5 corresponds to the 75 per cent. point in Figure 4. The result is that in Figure 5, benzene and heptane proportions have a straight-line relationship to compression ratio up to 40 parts of benzene in 10 parts of heptane, which corresponds to 80 per cent. of benzene in heptane, or to a limiting compression-ratio of 6.0:1 under the conditions of this work. A similar relationship exists in the case of mixtures of toluene in heptane. Iso-octane does not lend itself to this method of plotting to any advantage.

This latter method of constructing a scale of knock rating has been presented here to illustrate that, not only is there a choice as to the most suitable compound to serve as a standard fuel, which definite selection it is not a function of this paper to make, but that the method of expressing results or of establishing the scale of anti-knock quality in the best and most useful form is also a matter that needs consideration.

TO RESUME OPERATIONS

Kane, Pa., Jan. 20.—The Mount Jewett plant of the Interstate Window Glass Corporation, idle for several months, is expected to resume operations on a capacity basis early in February, according to an official announcement last week.

FORD BOOSTS PAY ROLL AT INDIANAPOLIS PLANT

Indianapolis, Ind., Jan 20.—About twenty-five men a day are being added to the employment roll at the Indianapolis branch of the Ford Motor Company in connection with the reopening of the plant soon after the first of the year, it is announced here by factory officials.

The progressive production schedule announced at the time of the resumption of operations has been carried out until about eighty-five cars are coming from the assembly line each day, according to the report. Before the plant was closed late in November 160 cars were leaving the line daily.

EASTERN GROUP OF A. P. I. HOLDS SESSION IN DETROIT

Detroit, Mich., Jan. 20.—Eastern group on automotive transportation, which works under the American Petroleum Institute's general committee on automotive transportation, met in the Book-Cadillac Hotel here today in connection with the annual meeting of the Society of Automotive Engineers. Possibilities of tank standardization were considered and a discussion with the S. A. E. Standard's committee of a possible study of tank, chassis and wheel base lengths was held.

CHEVROLET DEALER EXPANDS

Pontiac, Ill., Jan. 17. — Barrow-Johnson, Inc., Chevrolet dealer here since June of last year, has leased the east part of the Nelson Building, the west part of which is occupied by the Pontiac Buick Company. C. R. Barrow and A. A. Johnson have expanded the business where increased space is necessary, and will have both the main and second floor space 52x120 feet, which is now being entirely remodeled.

TIRE MAKERS PAY HEAVY DIVIDENDS

(Continued from Page 1)

ing the year in addition to the regular $5 payment.

Among other noteworthy financial events of the year among the rubber manufacturers was the readjustment of its capitalization by the Firestone Tire and Rubber Company. The old common stock was split up five-for-one, the holders receiving a 400 per cent. stock dividend on their old shares. The old preferred stock was replaced with an issue of $60,000,000 in new preferred paying 6 per cent. The new common stock was put on a $1.60 annual basis.

The chief difference between the rubber section of the automotive industry and the other sections is the fact that the rubber manufacturers have greater volume of outstanding preferred stocks in proportion to the common than either the passenger car, truck or accessory makers. While in the case of the other groups in this industry, the preferred dividend payments were small in comparison to the common stock payments, the preferred payments in the rubber group in 1929 were greater than the common, although the margin was small.

THE payment of dividends on preferred stock of the rubber manufacturers used in this compilation amounted to $11,493,539 in 1929, as compared with $11,000,259 paid to holders of common shares.

The heaviest dividend payer among this group in 1929 was the Goodyear Tire and Rubber Company, with a payment of $8,964,416 by the parent company and $959 699 by the Canadian unit and $535,766 by the California company.

The Firestone company was second with payments totaling $5,497,533. This company differed from the rest in that its payment of $2,960,720 on the common stock was greater than its $2,446,813 payment on its preferred stock.

Following is a tabulation of the dividend payments of the six leading dividend payers of the industry last year:—

PAYMENTS ON COMMON STOCK

	Regular	Cash Extra	Paid in Stock	PAYMENTS PREFERRED	ON TOTAL PAYMENTS
Firestone	$2,960,720	None	400%	$2,446,813	$5,407,533
Goodrich	4,214,552	None	None	2,290,400	6,504,957
Goodyear	3,421,987	None	None	5,539,429	8,964,416
Goodyear of Canada	200,000	$200,000	None	559,699	959,699
Goodyear of California	None	None	None	535,766	535,766
Seiberling	None	None	None	121,432	121,432
Totals	$10,800,259	$200,000		$11,493,539	$22,493,798

Car Shows Planned In Several Cities

Seattle, Wash., Jan. 20.—S. L. Savidge, newly elected president of the Seattle Automobile Dealers' Association, succeeding W. L. Eaton, Dodge dealer, has been selected as general chairman of the coming Seattle automobile show, likewise succeeding Mr. Eaton. Mr. Savidge is the Hupmobile dealer. The show opens February 24.

Paterson, N. J., Jan. 20.—The Paterson Auto Trade Association is set for the opening of the annual automobile show today in the Armory. In assignment of space by drawing for positions, George Patterson of the Annis - Patterson Company picked first position. The next best position went to Harry M. Smith, president of the association.

South Bend, Ind., Jan. 20.—The South Bend Automotive Trade Association is pushing plans for the annual automobile show, February 4 to 8, in the Granada Theater Building. C. W. Beistle is general chairman. The association has elected officers for 1930. Mayor William Riley Hinkle, for the fourth consecutive time, was honored by being made president. Otto A. Scherman is vice-president; Howard Chambers, secretary-treasurer.

Louisville, Ky., Jan. 20.—Louisville Automobile Dealers' Association opened its annual automobile show Saturday night, to run through January 25, at the Jefferson County Armory. More light trucks are on exhibit than ever.

Muncie, Ind., Jan. 20.—The annual show dates for the Automobile Dealers' Association have been set by a committee appointed by President Frank N. Reed as March 20, 21, 22. The show will be held in the field house, North Walnut Street, where it took place last year. Guerney Dawson is chairman of the show committee, assisted by Hansel Peterson and W. W. Thomson.

GRIFFITH SEES INDUSTRY MORE STABILIZED IN 1930

Toledo, O., Jan. 20.——Closer relationship between the automobile manufacturer and the dealer is evident this year and is indicative of a better stabilized industry, says Warren E. Griffith, president of the Landman-Griffith Company, Chrysler dealer here, and head of the National Automobile Dealers' Association, in addressing the passenger car division of the Toledo Automotive Trades Association.

TAKES ON G. M. C. TRUCKS

Duluth, Minn., Jan. 17. — The Rockhill Buick Company at 226 East Superior St., has announced that it has been appointed sales and service dealer in the Duluth territory for General Motors trucks.

DURANT OPENS ITS NEW DETROIT FACTORY BRANCH

Detroit, Jan. 20.—A new Durant factory branch, located on Cass Avenue, opposite Convention Hall, where the Detroit automobile shows are held, was opened Saturday to provide adequate sales and service facilities to owners and prospective owners of Durant cars and Rugby Trucks in and near Detroit.

"It is our aim and ambition," said Edgar W. Mong, manager of the branch, "to provide facilities which are entirely in harmony with the high ideals fostered by the executives who now direct the affairs of Durant Motors, Inc., and worthy of the new Durant cars these men have developed."

The service division at the new factory branch, laid out and supervised by A. K. Steigerwalt, director of service at the factory at Lansing, and headed by Fred W. Irvine, is said to be a model.

CHRYSLER OPERATIONS IN DAYTON EXCHANGED

Dayton, O., Jan 20.— (UTPS).— Transfer of the machine shop operations of the Dayton Chrysler plant to the main plant at Detroit has been effected, with the sheet metal division of the Detroit plant being transferred to the Dayton plant.

The change will mean no reduction in the size of the Chrysler operations in Dayton, according to I. F. Park, manager, and will result in greater efficiency in the handling of the production of parts. Approximately the same number of employees will be at work.

NOTICE TO THE AUTOMOTIVE TRADE

There is available at the present time an executive whose experience in the automotive field over a period of years embraced—Factory Manager—Sales Manager—Production—Service—Branch Manager and some service in export work. He has been in both commercial and passenger car fields. He has a pleasing personality, is progressive and has no difficulty in adjusting himself to conditions. His character and experience will stand the acid test of close inspection. He is interested particularly in New England, but will listen to the right sort of a proposition elsewhere. Write

BOX NO. 256
Automotive Daily News
Graybar Bldg. New York City

A World Wide Organization Is Selling And Servicing The New ANDERSON-Ajax Steel Spring-Covers

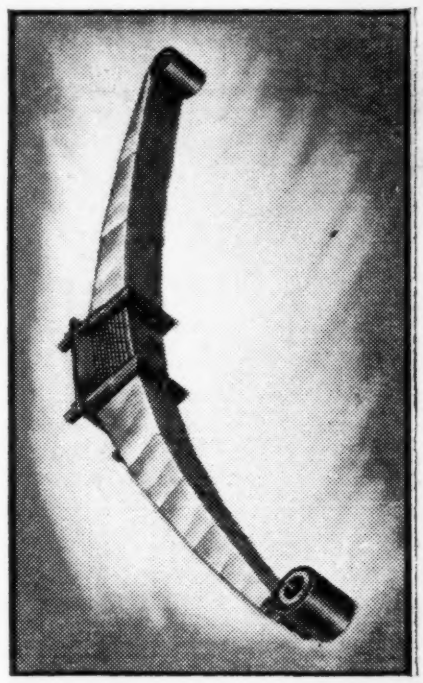
GABRIEL Distributes This LIFE-TIME PROTECTION For SPRINGS

GABRIEL Snubber Manufacturing Company of Cleveland — famed as providers of riding comfort — have just been appointed exclusive trade distributors of Anderson-Ajax Steel Spring-Covers. Thirty-three hundred Gabriel distributors — the world over — are now introducing these new steel jackets that solve for all time the problem of spring protection and spring preservation.

These same distributors, these engineers responsible for the "floating rides" of sixteen million Gabriel cushioned cars, are now at work to give the latest motoring refinement to car owners everywhere — armor for springs that insures new-day rideability, miles upon miles.

For the first time, here are spring covers of rugged, lasting steel — steel that becomes part of the bone and fibre of the car itself — steel that seals needed lubrication in the springs just as surely and permanently as it keeps out destructive dirt and rust.

Springs have always needed protection like this . . . Delicate moving parts that they are — metal rubbing against metal — they were not designed for exposure to the grime and dirt of travel. Exposed to weather they soon stiffen, rust and squeak . . . then smooth, quiet riding is gone.



And now, through Gabriel, the automotive trade will get the news of this revolutionary development in spring protection. Gabriel distributors, around the corner from everywhere, will be glad to demonstrate these steel spring covers that have won so completely the endorsement of the foremost automotive engineers.

See these new steel spring-covers at the Chicago Show, exhibited in conjunction with Gabriel Snubber Manufacturing Company, at Booth 123, at The Coliseum . . . or at Hotel Blackstone, Suites 619 and 620 . . . Anderson Manufacturing Company, 149 Sidney Street, Cambridge, Massachusetts.

Manufacturer's Representative
GEORGE H. HUNT
2-244 General Motors Building, Detroit, Michigan

ANDERSON-*Ajax* *Steel* Spring-Covers

ANDERSON MANUFACTURING CO. CAMBRIDGE MASSACHUSETTS